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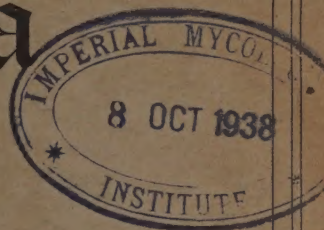
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PUBLISHED JANUARY. 1937.



AN ACCOUNT OF THE SOUTH AFRICAN SPECIES OF TRIBULUS *Tourn. ex Linn.*

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AN ACCOUNT

OF THE

SOUTH AFRICAN SPECIES OF *TRIBULUS*

Tourn. ex Linn.

BY

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In Southern Africa, the genus *Tribulus* L. is of considerable economic importance, since several species have been found to be the cause of a troublesome disease in sheep, known as "geeldikkop."

Preliminary experiments and investigations carried out during the past few years by veterinary and agricultural officers in connection with this disease, have resulted in the accumulation of much material in certain South African herbaria. Increasing difficulties were encountered in naming such material forwarded for identification from various sources to the National Herbarium, Pretoria. These difficulties were due to the fact that the species appeared to be ill-defined and the writer was consequently encouraged to undertake a study with a view of defining more clearly the limits of these species.

During the course of this investigation the material in the South African and that from Southern Africa in several of the larger European herbaria was studied. [Royal Botanic Gardens, Kew; Brit. Museum (Natural History); Berlin-Dahlem; German Univ., Prague; Mus., Stockholm; Univ., Zürich.]

The conclusions arrived at in this paper have thus been based almost entirely on the study of dried material. As will be pointed out, the results have proved to be somewhat inadequate and unsatisfactory, i.e. the limits of several species as yet remain uncertain.

Recourse to field work and breeding experiments seems desirable, in order that a clear concept of the limits of such species be obtained which appear to exhibit an extremely wide range of variation in vegetative, flowering and fruiting characters.

The first record of the genus *Tribulus* in a work relating to South African plants appears to be that of *Thunb. Prodr.* 79 (1794) where the Mediterranean species *T. terrestris* L. is enumerated. *Harvey* in his *Genera of S. Afr. Pl.* 46 (1838) likewise only mentions this species, and remarks that it is "a very common weed in cult. ground in the months of Nov. and Dec. It is perhaps merely naturalised from the South of Europe." *Presl, Bot. Bemerk.* 29-30 (1844) enumerated five species from the (present-day) limits of the Cape Province. He considered these five species to be distinct from *T. terrestris* L. In how far his views are justified will be dealt with under the species concerned. *Harvey* apparently overlooked *Presl's* paper, as only two species are enumerated in the second edition of his *Genera of S. Afr. Pl.* 36 (1868), although the first volume of the *Fl. Cap.* (1859-60) had by then been published. In the latter *Sonder* mentions four species, accepting and rejecting some of *Presl's* species. During the time between the appearance of *Fl. Cap. I.* and the present day, relatively few references to South African *Tribuli* are to be found in literature. Apart from *Engler's* account in *Veg. der Erde*, no comprehensive

enumeration of the species exists. In *Fedde Rep.* XXIV (1927) *Dinter* enumerates the species which had been recorded from South West Africa up to the year 1917 and *Range* did very much the same thing, on the basis of his own collections, in *Fedde Rep.* XXXVI (1934).

The following pages are thus intended to be of a revisional character as well as a critical exposition of the conclusions drawn from the study of a wide range of herbarium material from southern Africa.

In the list of localities given under each species only such specimens as were actually seen and examined are quoted.

TRIBULUS Tourn. ex. Linn. Syst. ed. I (1735); Linn. Sp. Pl. ed. I. 386 (1753):—

Sepals 5, deciduous or semi-persistent. *Petals* 5, spreading, shorter to longer than the sepals, deciduous. *Stamens* 10, those opposite the petals somewhat longer than those alternating with the petals; filaments subulate, those opposite the sepals with both an extra and intrastaminal basal gland; anthers cordate or oblong-cordate; intrastaminal glands free or connate to form a shallow cup at the base of the ovary. *Ovary* sessile, covered with erect bristle-like hairs, 5-lobed, consisting of 5 intergrown carpels; each carpel with 3-5 ovules; style short or absent; stigma conspicuous, 5-angled, pyramidal or hemispheric, formed by intergrowth of the 5 stigmatic lobes. *Fruit* 5-angled, at length breaking up into 5 indehiscent cocci; cocci dorsally tuberculated, unarmed, spinous, winged, or winged and spinous, 1-5 seeded. *Seeds* exalbuminous.

Xerophilous, mostly annual or perennial herbs, more rarely perennial shrubs; branches prostrate or ascending, more rarely erect. *Leaves* opposite, one usually larger than the other, more rarely alternate, bistipulate, abruptly pinnate; leaflets opposite, entire, somewhat oblique. *Pedicels* axillary, one-flowered. *Petals* usually yellow.

TAXONOMICALLY IMPORTANT CHARACTERS.

The habit of the plant is of some importance. The erect shrubby perennial nature of *T. excrucians* Wawra is a constant and unique character among the African species known up to the present day and by means of which it may readily be distinguished from the other species. The remaining members are all very much alike in habit, i.e. usually prostrate or semi-prostrate annuals or perennials.

In purely vegetative characters each of these species shows a marked degree of variation, being very plastic with regard to the size, shape, indumentum, etc., of the vegetative parts. Such variation is frequently met with in plants inhabiting arid or semi-arid regions and may probably be accounted for by the edaphic and climatic conditions under which the plants develop.

The length of the pedicel appears to be of some taxonomic value. In the *large-flowered prostrate* species it always exceeds the subtending leaf, and even in extreme cases still attains the length of the leaf, whereas in the *small-flowered* species the pedicel is usually exceeded by the leaf.

The size of the flower and hence the petals is of some value, since species such as *T. terrestris* L. may be excluded from the "large-flowered" species on basis of this character. The ratio of length of petals to sepals is of very little and in the writer's opinion probably of no taxonomic value. Many measurements carried out with a view to detecting whether that ratio is a character of some constancy proved it to be of little value; the flowers on even one and the same individual show such strong variation that allied species (distinguishable by other characters) were found to overlap.

The nature of the intrastaminal glands situated at the base of the ovary has been found to be of great taxonomic value, and two forms may be recognised: (a) glands free,

distinct, and not connate (fig. I.), (b) glands connate to form a shallow cup at the base of the ovary (fig. II.). At times the region of intergrowth of the glands is not readily visible in herbarium specimens, and in such cases soaking and careful dissection is essential.

The shape and size of the stigma appears to be correlated with the nature of the intrastaminal glands. A hemispheric somewhat asymmetric stigma (fig. I.) is found in species with free glands and small flowers, whereas a very much larger pyramidal almost symmetric stigma (fig. II.) is correlated with intergrown glands. The length of the style appears to be variable and for this reason was discarded as a taxonomically useless character.

Taxonomically the fruits are of the greatest importance. In their absence several closely allied species, resembling each other in vegetative and floral characters, are readily confused; in order to identify large-flowered species with certainty the presence of fruits is indispensable. Whereas the fruits of species such as *T. cristatus* Presl exhibit characters which have proved to be fairly constant and thus taxonomically of the utmost importance, other species exhibit but little constancy in this respect. *T. excrucians* Wawra may serve as an example of the species in which the fruits exhibit great variation both in regard to size and degree of spinosity of the individual cocci. Owing greatly to the limited amount of material available for study to the older authors, too much value was attached to the nature of the fruits. Study of a wide range of material has shown that fruit characters of several species are to be used with some discretion. This remark brings forward the question of natural hybrids about which *Dinter* states that he has never observed any plant possessing "Bastardeigenschaften." As will be shown later, there appears to be evidence in favour of the occurrence of natural hybrids among the species of *Tribulus* from Southern Africa.

KEY TO THE SPECIES.

I. Intrastaminal glands connate to form a shallow cup at the base of the ovary; stigma slender, usually pyramidal (fig. II.):—

A. Plant an erect shrubby perennial attaining a height of 1 metre or more; main stem woody with corky bark; fruits (cocci) unarmed or armed with one or two pairs of short lateral spines; spines at times somewhat flattened and almost winglike.....1. *excrucians*.

AA. Plant annual or perennial, *prostrate* or at length with the extremities of the branches somewhat ascending:

B. Cocci winged; wings armed with spines or wholly devoid of spines:

C. Wings of cocci with numerous pungent slender marginal spines and very often a long spine arising from the centre of each wing near the dorsal crest of the coccus.....2. *cristatus*.

CC. Wings of cocci without or with several marginal blunt teeth but never with a spine arising from the surface of the wing, leathery and subrigid, or thin papery and brittle in texture extremely variable in shape.....3. *pterophorus*.

BB. Cocci never winged but armed with 2 or more pairs of spines; spines variable in length, arising from the sides of the dorsal crest or near the base of the coccus.....4. *Zeyheri*.

II. Intrastaminal glands free, never connate to form a shallow cup; stigma hemispheric, never slender (fig. I); petals 2-12 mm. long; sepals 2-6 mm. long.....5. *terrestris*.

ENUMERATION OF THE SPECIES.

1. *T. excrucians* Wawra, in Sitzb. Akad. Wien. Math.—Nat. XXXVIII. 557 (1860).

Syn.: *T. micans* Welw. Apont. 566 (1858), nomen subnudum.

T. terrestris Oliv., in Fl. Trop. Afr. I, 283 (1868) *pro parte*, non Linn.; Hiern., Welw., Cat. Afr. Pl., 105 (1896).

T. Pechullii O. Kuntze in Jahrb. Bot. Gart. Berl. IV, 262 (1886); Engler, Jahrb. X, 31 (1888); Schinz in Bull. Herb. Boiss. II, 187 (1894); Heering and Grimme, Untersuch. Weideverh. Deutsch-Südwest afr., 27 (1911); Engler, Veget. der Erde. 9, III, i, 738 (1915), cum fig. 343 P-R et Pflzfam. ed. II, 19a, 176 (1931), cum fig. 84 P-R.

T. Zeyheri Sond. var. *Pechuelii* Schinz, in Verh. Bot. Ver. Prov. Brandenb. XXIX, 54 (1887).

T. inermis Engl., Bot. Jahrb. X, 32 (1888), non Kralik.; Heering and Grimme, Untersuch. Weideverh. Deutsch-Südwestafr., 27 (1911).

T. erectus Engl., Bot. Jahrb. X, 32 (1888); Dinter, Deutsch-Südwest-Afrika, 86 (1909); Engl., Veget. der Erde 9, III, i, 738 (1915); Dinter, in Fedde Rep. XXIV, 14 (1927).

An erect or suberect perennial *shrub* up to 1.5 m. high, with a short stem, up to 5 cm. thick near the base. *Branches* erect, robust, longitudinally striate, terete, pubescent, glabrous in age; internodes up to 6 cm. long, but usually much shorter. *Leaves* unequal; the larger up to 7 cm. long, 6–10-jugate; the smaller up to 3 cm. long, 3–6-jugate; stipules up to 7 mm. long, linear-lanceolate to obliquely lanceolate, acute, silky pubescent on the outer surface, less so on the inner surface; petiole silky pubescent, slightly winged towards the apex; leaflets obliquely oblong to lanceolate, acute, up to 25 mm. long and 8 mm. broad, but usually much smaller, densely silky pubescent on the lower surface. *Pedicel* fairly short, 1.5–2 cm. long, terete, silky pubescent, markedly striate in age. *Flower-buds* ovate, markedly acuminate. *Sepals* linear-lanceolate, up to 11 mm. long and 3 mm. broad, silky pubescent on the outer surface. *Petals* broadly cuneate, up to 25 mm. long, often much smaller. *Filaments* 3.5 mm. long; anthers 2.5 mm. long. *Intrastaminal glands* connate to form a very shallow cup at the base of the ovary. *Stigma* pyramidal, about 2.5 mm. long. *Mature fruit* at length breaking up into several (usually less than 5) cocci; cocci unarmed or armed, some without any signs of spines, merely tubercled laterally and dorsally, densely but very minutely pubescent, others again armed with 1–3 pairs of lateral spines, which at times are much flattened and almost wing-like (fig. III).

ANGOLA.—Loanda: July, *Menyhart*, 228. Lobito Bay: Aug., *Obermeyer*, in Herb. Tvl. Mus. 32816. Benguela: Jan., *Wawra*, 299 (types in Herb. Mus. Nat. Hist. Vindob).

Between Mossamedes and Rio Bero: Apr., *Hopfner*, 5. Mossamedes: July, *Welwitsch*, 1579, 1580. Oct., *Brühl*, 5, 6. *Jessen*, 329. March, *Fritzsche*, 2.

SOUTH WEST AFRICA.—Swakopmund: *Dinter* 22. *Belck*, 63a; upright perennial in bed of river, *Bradfield*, 550, 580. Swakoprivier: May, *Marloth*, 1457. Nov. *Rewsch*, 63a. Walfish Bay: Okahandja: Oct., *Luderitz*, 147. Husab: June, *Fleck*, 727. March, *Dinter*, 8446. Kuwosis: Oct., *Schenck*, 433. Haigamchab: Jan., *Galpin et Pearson*, 7607, 7637; shrub along banks of Swakoprivier, June, *Gurich*, 129, 147. Khanthal: Apr., *Engler*, 6058. Ukuib: Dec., *Pogge*, 9. Gamkoischas: May, *Dinter*, 207. Usakos: June, *Marloth*, 1457a; Nov., *Schinz*, 1120. Otjimbingue: May, *Marloth*, 1300, 1390. Okahandja, cult.: Nov., *Dinter*, 207.

Without precise locality: *Luderitz*, 208. *Schenck*, 452. *Nels*, 16. *Francois*, 38. *Pechuel Lösche*, 36.

In the description of *T. excrucians*, Wawra l.c. cites the type as being his 290. The specimen in the Vienna Herbarium and a duplicate of same in the Zurich Herbarium both bear the number 299. The number *Wawra* 290 is thus probably a typographic error for 299.

The shrubby nature, together with the peculiar ashy-grey silky appearance of the plant, are the most reliable characters by which this can be distinguished from other related species. Apparently *T. excrucians* has been overlooked by all authors cited below since they do not refer to this species in their work relating to *Tribulus*.

O. Kuntze (1886) l.c. in describing *T. pechuelii* apparently did not know that he was dealing with a shrubby species (the label on the type specimen gives no information with regard to the habit of the plant). He consequently made use of the number of leaflets per leaf, the nature of the fruit and other characters to distinguish his species from allied plants such as *T. Zeyheri* and *T. cistoides*. Both the latter, however, are prostrate in habit, the branches only rarely ascending to a few centimetres above the level of the substratum, whereas *T. excrucians* (*T. Pechuelii* of various collectors) is a perennial undershrub or shrub attaining a height of up to 1.5 metres. It also possesses a short main stem which may equal a "man's wrist" in thickness.

The colour of the flowers may either be pale yellow (*Dinter*) or yellow with a dark claw (*Marloth*). The size of the petals is variable and may be anything from 15-24 mm. long; the petals are ± 2.5 times the length of the sepals.

Schinz (1887) l.c. pointed out that contrary to Kuntze's statement regarding the unarmed nature of the fruits, the cocci showed the presence of small spines. As a consequence of the armed nature of the cocci, Schinz lowered the rank of this plant and considered it to be a variety, viz. *T. Zeyheri* Sond. var. *Pechuelii* Schinz. Schinz at this time was unaware of the shrubby nature of the species.

Engler (1888) l.c. independently described a shrubby species (*T. erectus*) from South West Africa. He also hinted at the presence of a second erect species in the form of *T. inermis* since he described the habit of this plant as "procumbens?". Engler had overlooked *T. excrucians* Wawra but had naturally consulted Kuntze's type in drawing up his descriptions; being a hypercritical worker he considered *T. erectus* and *T. inermis* to be distinct from Kuntze's species (the latter is a very fragmentary specimen only possessing young fruits). His views which were naturally based on the material available for study at the time appear to have been by no means unreasonable.

As a result of Engler's work as well as the study of further material Schinz (1894) l.c. subsequently somewhat modified his earlier views regarding the taxonomic position of *T. Zeyheri* Sond var. *Pechuelii* Schinz. He revived *T. Pechuelii* Kuntze, and considered it a valid species still closely allied to *T. Zeyheri* Sond. Engler's species *T. inermis* and *T. erectus* had also come to his notice and realising the great variability of the fruits he correctly considered them to be conspecific with *T. Pechuelii* Kuntze. Attention may be drawn to the fact that *T. micans* Welw. from Angola had apparently been overlooked and perhaps wilfully excluded in the absence of a description by all three authors mentioned above. [Since *Welwitsch* did not draw up a valid diagnosis *T. micans* Welw. is a *nomen subnudum*.] The type of this plant in Herb. Mus. Brit. undoubtedly is conspecific with *T. excrucians* Wawra, which is the oldest validly published name for this species. *Dinter* (1927) l.c. also considers *T. erectus*, *T. inermis* and *T. Pechuelii* to be conspecific, but adopts the name *T. erectus* to designate the species which, however, is not in accordance with the International Rules of Nomenclature.

As a result of my own studies of dried material I have arrived at the conclusion that all the species in question are conspecific. The fruits of many specimens seen showed either the presence or absence of spines; at times the spines were so weakly developed that they could easily have been overlooked. The fruits of even one and the same plant

show a fair degree of variation. *Dinter* (1927) l.c. says of *T. erectus* that this species "ist in jeder Beziehung konstant, wenn auch höchst wahrscheinlich aus *T. Zeyheri* hervorgegangen," furthermore that the fruits may either be spineless or weakly thorny.

Marloth 1457 and 1457b from Swakop, S.W.A. and *Pocock* 975 from Benguela, Angola belong to *T. excrucians*. These sheets, however, have elliptic acute leaflets which are much larger (25 mm. l.) and broader (up to 9 mm.) and more markedly veined than those of the typical species. *Engler* (1888) l.c. places *Marloth* 1457 and 1457b under *T. Pechuelii* but mentions that *Marloth* collected "diese Art. . . . in zwei Formen." The cocci of *Marloth* 1457 and 1457b are glabrous in age except for a few bristly hairs, whereas in *Pocock* 975 they are densely minutely pubescent. In all these specimens the cocci are armed with 1-2 pairs of short lateral spines and the whole appearance of these fruits is somewhat different from those of typical *T. excrucians*. But having studied a wide range of material I am of opinion that all the sheets cited above probably only represent one variable species.

Study of this interesting species together with breeding experiments will undoubtedly be necessary in order to prove whether in the foregoing only a single or perhaps more than one closely related species is involved.

T. excrucians Wawra appears to have a very limited geographic distribution. It is only known to occur in the western regions of the Mandate of South West Africa and Angola, where it is mainly found growing in or near the dry sandy beds of desert rivers.

2. *T. cristatus* Presl, Bot. Bemerk., in Abh. Böhm. Ges. Wiss. V. 3.29 (1844); Sond., in Fl. Cap. I. 354 (1859-1860); Glover, in Ann. S. Afr. Mus. IX. iii. 170 (1913); Engl., Veg. der Erde 9. III. i. 738 (1915), cum fig. 343 V; *Dinter*, in Fedde Rep. XXIV. 15 (1927); Engl., Pflzfam. ed. II. 19a. 177 (1931), cum fig. 84 V; Range, in Fedde Rep. XXXVI. 249 (1934).

As *Presl's* description is somewhat incomplete and that of *Sonder* in the *Fl. Cap.* was based on the same gathering and consequently does not add much to it, it was thought necessary to draw up an amended description based on the material now represented in the South African and European herbaria consulted.

An annual, or possibly a biennial or perennial plant. Branches prostrate, radiating from the much branched rootstock, 12-100 cm. long, usually again branched but not conspicuously so. Branches, stipules, leaves, peduncles and calyx, in fact all vegetative parts of the plant usually hirsute with bulbous-based bristly hairs; internodes terete, striate, 0.5-6.0 cm. long. Leaves unequal, the larger 1.5-6.5 cm. long with 3-8 pairs of leaflets; the smaller (subtending a branch or flower) with 2-4 pairs of leaflets and much shorter than the first internode of the subtended branch, or the peduncle; stipules 2.5-8 mm. long, obliquely lanceolate, acuminate, upper and lower surface hirsute or almost glabrous, with marginal bulbous-based hairs; petiole hirsute or minutely pubescent, at times somewhat winged; leaflets hirsute or glabrous except along the midrib above, hirsute and paler beneath, obliquely oblong, obtuse or acute, with marginal bulbous-based hairs, up to 14 mm. long and 6 mm. broad but usually much smaller. Pedicel 2.5-4 cm. long, usually 2 to 3 times the length of the subtending leaf, striate, terete, set with tubercle-based hairs interspersed between a finer indumentum. Flower-buds abruptly acuminate. Sepals persistent, acuminate, 8-12 mm. long. Petals broadly cuneate, up to 25 mm. long, apparently always pale yellow in colour, twice or slightly more than twice as long as the sepals. Filaments up to 4 mm. long, bearing anthers about 2 mm. long. Style one-third to two-thirds as long as the stigma; stigma conical-oblong, slender and 2-3.5 mm. long. Disc at base of ovary a shallow cup formed by the intergrowth of the intrastaminal glands. Mature fruits variable in size, glabrous except for a few bristle-like hairs, 6-25 mm. long, 12-30 mm. in diameter including the wings, finally breaking up into 5 cocci; cocci with lateral oblong rounded wings, dorsally ridged and set with tuberculate bristly hairs; wings rounded, transversely markedly striate with marginal subrigid acute spines of unequal length often

bearing an analogous spine dorsally from the centre of each wing near the body of the coccus, a character which appears to be unique and by which this species may readily be distinguished from all the other South African species. This spine may sometimes be intergrown with the wing and in such cases is less conspicuous (Fig. IV).

SOUTH WEST AFRICA.—Great Namaqualand: Elephantenfluss: *Range*, 1483; Eirup; nr. Marienthal: March, *Steyn*, 22533. Gouchassib R.: Aug., *Range* 727. Nabaos nr. Keetmanshoop: Apr., *Range*, 1313. Kuibis: Sandstein plateau: Jan., *Dinter*, 1166 and Tafelbergssandstein: Jan., *Dinter*, 1248. Seeheim, sandy bed of Fish river: Apr., *Engler*, 6633 and Apr., *Dinter*, 2967. Klein Karas: October, *Dinter*, 5055 and Apr., *Örtendahl*, 95. Satansplatz: March, *Dinter*, 2041. Wasserfall: Jan., *Pearson*, 3154. Between Dabai-gabis and Gründoor: Febr., *Pearson*, 3154.

CAPE PROVINCE.—Little Namaqualand: Verleptpram, stony hills on the Orange river: *Drège*, 7160 (type deposited in Herb. Univ. Germ. Prag.). Herbert: Douglas, *Orpen in Mus. Austr. Afr.*, 14494. Prieska: Prieska, on sand dunes north of Orange river: March, *Wilman*, 3039 and 3040; in sand near Prieska, March, *Bryant*, 880 and J. 251.

Examination of many herbarium specimens has led me to believe that the above species is an annual. Specimens such as *Dinter* 5055 and *Pearson* 7863, however, suggest that the plants may be biennial and even perennial since these sheets possess a moderately branched rootstock bearing the remains of dry withered branches at the apex. *Bryant* 880 in Herb. Kew. bears a note to the effect that the species is annual.

T. cristatus Presl appears to be consistently prostrate in habit with the branches radiating from the crown of the rootstock. The length of the internodes of the branches is a very variable one; robust specimens usually have longer internodes than weaker specimens. This character appears to be correlated with the size of leaf, leaflets, flower and fruit, i.e. a weak specimen usually is smaller in all vegetative and reproductive characters than a luxuriant specimen. There does not appear to be a great deal of variation in the degree of hairiness in the vegetative parts of the species.

Bryant 880 bears a remark to the effect that this species does not "vary in flower or shape of fruit." From my own observations of herbarium material I cannot agree with the first part of this statement. The smallest flowers so far seen had sepals 8 mm. long and petals about 18 mm. long, the largest sepals up to 12 mm. long and petals up to 25 mm. long. The colour of the petals appears to be consistently pale yellow in colour and according to *Bryant* the "flowers open for an hour or two in the morning" and are "very fugacious." The shape and consistency of the fruits undoubtedly form the best diagnostic characters of the species. Whereas the size of the fruits is variable, the shape and texture, however, is fairly consistent. The largest fruits seen had wings about 25 mm. long and up to 10 mm. broad, but on an average the fruits are much smaller. The species flowers during the months of November and April.

The plants appear to prefer a sandy substratum and the species therefore is primarily psammophytic and according to *Bryant* is "very rarely found on hills."

The distribution is fairly restricted and the species appears to be limited to the sandy regions of Griqualand West, Little and Great Namaqualand. It has not yet been recorded further north than the Mandate of South West Africa and its southern limit appears to be approximately the Orange River basin.

Bryant has observed that this species "often grows alongside *T. terrestris* L. but never hybridises apparently." *Dinter* regards *T. cristatus* Presl as being a very good species having nothing in common with *T. pterophorus* Presl, an opinion which I am inclined to endorse.

If accompanied by young or preferably mature fruits, *T. cristatus* Presl may always be readily identified. It is one of the most clearly defined species in the whole genus and owing to its characteristic fruits, taxonomically occupies a somewhat isolated position.

Among the material examined none was observed to exhibit intermediate characters, an indication that this species does not tend towards natural hybridisation.

3. *T. pterophorus* Presl, Bot. Bemerk. in Abh. Böhm. Ges. Wiss. V. 3. 29 (1844); Sonder, in Fl. Cap. I. 353 (1859-1860); Dinter, Deutsch-Südwest-Afrika, 86 (1909); Glover, in Ann. S. Afr. Mus. IX. iii. 170 (1913); Engl., Veg. der Erde, 9. III. i. 738 (1915), cum fig. 343 U; Burt Davy, Flow. Pl. & Ferns I. 187 (1926); Dinter, in Fedde Rep. XXIV. 15 (1927) et Fedde Rep. Beih. LIII. 50 (1928); Engl., Pflzfam. ed II. 19a. 176 (1931), cum fig. 84 U; Range, in Fedde Rep. XXXVI. 249 (1934).

Syn.:—

T. alatus Drège, Zwei Pflzgeogr. Docum. 227 (1843), non Del.

T. securidocarpus Engl., Veg. der Erde, 9. III. i. 738 (1915) in obs., cum. fig. 343 S. a, b, c; Dinter, in Fedde Rep. XXIV. 15 (1927); Engl., Pflzfam. ed. II. 19a. 176 (1931), cum fig. 84 S. a, b, c; Range, in Fedde Rep. XXXVI. 249 (1934).

T. securidocarpus Engl. forma *vulgaris* Engl., l.c., cum fig. 343, S. a, b.

T. securidocarpus Engl. var. *subtruncatus* Engl., l.c., cum fig. 343. S. c.

T. albescens Schltr. ex Dinter, in Fedde Rep. XXIV, 14 (1927), nomen tantum; Engler, Pflzfam. ed. II. 19a, 176 (1931).

An annual. Branches prostrate, radiating from the much branched crown of the rootstock, up to 100 cm. long and usually somewhat branched again, in all vegetative parts more or less densely hirsute with a fine indumentum scattered between which are much longer bulbous-based hairs; internodes up to 10 cm. long, usually much shorter, striate, terete. Leaves unequal; the larger up to 6 cm. long, 6-9-jugate; the smaller (subtending a branch or pedicel) up to 3.5 cm. long, 3-6-jugate; stipules 3.5-6 mm. long, obliquely lanceolate, acute, upper and lower surface pubescent, with marginal tubercle-based hairs; petiole not winged; leaflets obliquely oblong, sub-acute or oblique, up to 12 mm. long and 6 mm. broad, densely silky beneath, less so on the upper surface. Pedicel 1-3 times as long as the subtending leaf, up to 3.5 cm. long. Flower-buds ovate in outline, hardly acuminate. Sepals linear-lanceolate, up to 10 mm. long and 2.5 mm. broad, acute, silky pubescent without. Petals broadly cuneate, 1.5 to 2 times the length of the sepals, up to 20 mm. long and apparently bright yellow to orange in colour. Filaments up to 4 mm. long, bearing anthers up to 3.0 mm. long. Style short; stigma broadly pyramidal, 1.25-2.5 mm. long. Intrastaminal glands united to form a shallow cup at the base of the ovary. Carpels and young fruit minutely pubescent. Mature fruit winged, glabrous or minutely pubescent, at length breaking up into 5 cocci; cocci winged, with several spines on the dorsal crest, each terminating in a tubercle-based hair; wings extremely variable in shape, size and texture, often rounded, oblong, narrowed and triangular or subtruncate, transversely striate and with one or several teeth on the margins, more rarely irregularly dentate, never spiny, papery, brittle or coriaceous and tough, minutely pubescent or glabrous, up to 18 mm. long and 10 mm. broad, but often very much smaller and showing mere traces of wings (Fig. V).

SOUTH WEST AFRICA.—Gt. Namaqualand: Marienthal: March, Dinter, 2022; March, Steyn, 22555 and 22546. Haribes: 40 km. S.W. of Marienthal, Apr., Engler, 6578, 6579, 6592. Garis: Oct., Hartman, 155, 155b. Between Packrien and Leberfluss: Trotha, 43. Sandverhaar: sand dunes, Febr., Pearson, 4693; tiefer sand, Jan. Dinter, 1187. Kubub-Fläche: March, Range, 232. Seeheim: Apr., Dinter, 2956; sandy bed of Fisch river, Apr., Engler, 663. Holoog: dry river bed, Pearson, 4120. Klein Karas: Dinter, 5101. Great Karasberge: Noachabeb, 1918, Blank, s.n. Keetmanshoop: Fenchel, 29. Sandfontein: Wilman, 2177. Satansplatz: Dinter, 2042; Ariamsvlei, farm Walserbrunn, Ortendahl, 316. Orange River: Gaidib, Dec., Dinter, 5138. Without precise locality, Afr.: Fleck, 26a.

CAPE PROVINCE.—Little Namaqualand : Orange River, Verleptpram, *Drège*. Wortel : Dec., *Pearson*, 3631 ; without precise locality : *Marloth*, 7809. Kenhardt : Upington, *Moss*, 10730 ; *Smith*, 2369. Gordonia : without precise locality, *Pole Evans*, 2180. Prieska : Prieska, March, *Bryant*, J. 39. Barkly West : Danielskuil, *Lawson*, in *McGregor Mus.*, 2121.

TRANSVAAL PROVINCE.—Zoutpansberg : Messina, nr. the town, *Young*, in *Hb. Moss.*, 14675.

From the large range of material studied it appears that this species is an annual or at the very most a biennial. The indumentum of the vegetative parts is more pronounced than in other species, especially with regard to the bulbous-based hairs, but this character is inadequate to identify the species in the absence of fruits.

The size of the flowers is extremely variable. *Engler* 6579 has flowers with petals about 8 mm. long whereas *Pearson* 4693 has such of over 15 mm. in length ; in fact they may reach a length up to 20 mm. The colour, however, appears to be consistently a pure though a somewhat pale yellow.

In fruiting characters the species, however, is extremely variable, especially with regard to the shape, size and texture, and degree of indumentum of the wings of the individual cocci. The colour of the wings appears to be brown, whereas in *T. cristatus* Presl they are apparently always pale olive-green in colour. The latter character is remarked upon by *Dinter*, who also states that he has never observed a transition from the one to the other. In sheets such as *Dinter* 1187 and *Bryant* J. 39 the extreme variation in the size and shape of the wings may be clearly seen. The texture of the wings is also of a very variable nature ; it may be papery and brittle showing all intermediate stages to rigidly coriaceous and tough. This great variation undoubtedly led *Engler* (1915) l.c. to figure and describe (inadequately ?) *T. securidocarpus* which he considered to be specifically distinct from our species in question. Under his species he also distinguished forma *vulgaris* and var. *subtruncatus*. Examination of the material of this species and its forms deposited in Herb. Mus. Bot. Béröl. has convinced me that neither the forms nor this species created by *Engler* can be upheld, as they fall within the limits of variation of *T. pterophorus*. A further argument in favour of this view is the following : the type number of *T. pterophorus* Presl in Herb. Mus. Brit. bears fruits which appear to be almost mature and comparison of these with such of typical *T. securidocarpus* Engl. have led me to believe that both these species are conspecific. *E. Meyer* when working through *Drège's* gatherings of *Tribulus* labelled certain sheets *Tribulus alatus* Delile ? thus (inadvertently ?) drawing attention to the similarity between the Cape plant and the true but distinct Indian and north-east African *Tribulus alatus* Del. As *Presl's* type of *T. pterophorus* cannot be traced in the *Herb. Un. Germ. Prag.* we have no evidence that this species is distinct from *T. securidocarpus* Engl., but the fact that the type numbers of *T. pterophorus* in both Herb. Kew and Herb. Mus. Brit. agree perfectly with the latter species and also with *Engler's* figure of *T. securidocarpus* is sufficient evidence to regard them as being conspecific.

T. albescens Schlechter ex *Dinter* l.c. is only more densely hispid than typical *T. pterophorus* Presl. It agrees in fruiting characters with, and therefore is also conspecific with the latter.

T. alatus Del., *T. macropterus* Boiss. and *T. pterocarpus* Ehrenb. are the nearest allies of *T. pterophorus*. *T. alatus* Del. and *T. macropterus*, however, both have smaller flowers, intrastaminal glands which are not joined to form a shallow cup at the base of the ovary and fruits with smaller and shorter wings. *T. pterocarpus* Ehrenb. has extremely small flowers with petals about 5 mm. long and the fruits, including wings, do not exceed 10 mm. in both length and diameter, characters by which it is readily distinguishable from *T. pterophorus*.

Dinter (1927) l.c. states that *T. pterophorus* and *T. securidocarpus* are undoubtedly closely related species, but never show transitions between each other. I have had the privilege of studying a wide range of material, my observations have led me to the following conclusions. The extreme forms included under the two species can definitely be distinguished but since every degree of variation and in many cases great variation in the shapes of the fruits on one and the same plant can be observed, the question arises whether we are dealing with two distinct species and their numerous intermediates due to hybridisation. It is possible that *T. securidocarpus* may prove to be a hybrid of the parentage *T. pterophorus* on the one hand and *T. Zeyheri* or an allied species on the other, but this can only be proved by breeding experiments. The figure in Engler l.c. of *T. pterophorus* does not agree in shape with the fruits of the type numbers I have studied; should *T. pterophorus* Engl. (non Presl.) eventually be recognised as a distinct species, it will have to receive another name.

In order to decide with absolute certainty whether *T. pterophorus* Presl is an extremely variable species or includes more than one closely allied species with tendencies towards hybridisation, careful breeding experiments will be necessary. As I have had neither the opportunity of studying these plants in the field nor undertaking breeding experiments, my deductions are based on the study of herbarium material, and such conclusions I have reached and the views which are being forwarded here may later prove to be quite erroneous.

The distribution of the species is a fairly limited one. It is fairly frequent in the sandy parts of the Mandate of South West Africa and its southernmost limit appears to be approximately the Orange River basin. It has not yet been recorded from as far north as Angola.

A note on Blank s.n. (leg. anno 1918) in *Herb. Mus. Bot. Berol.* says "Aufschlag, das erste nach dem Sommerregen spriessende Grün, wächst überall und wird, besonders im jungen Zustande, von allem Vieh gern gefressen. Wenn die Samenkapseln gelb werden, sollen sie Schuld an der 'Geelsiekte' der Schafe sein. Das Fett der an dieser Krankheit verendeten Schafe ist durchweg gelb . . .", an indication that this species is suspected of causing "geeldikkop"? in sheep.

4. *T. Zeyheri* Sond., in Fl. Cap. I. 353 (1859-1860); Dinter, Deutsch-Südwest-Afrika. 85 (1909); Heering & Grimme, Unters. Weideverh. Deutsch-Südwestaf. 27 (1911); Glover, in Ann. S. Afr. Mus. IX. iii. 170 (1913); Engler, Veg. der Erde 9. III. i. 736 (1915), cum fig. 343Y; Burt Davy, Flow. Pl. & Ferns I. 187 (1926); Dinter, in Fedde Rep. XXIV. 15 (1927); Engler, Pflzfam. ed. II. 19a. 176 (1931), cum fig. 84 Y; Bremekamp, in Karsten u. Walter: Vegetationsbilder, XXII. 3. 3 (1932), cum fig. 13; Range, in Fedde Rep. XXXVI. 250 (1934).

Syn.: *T. Zeyheri* Sond., var. *hirtus* Schinz, in Verh. Bot. Ver. Brandenb. XXIX, 54 (1887).

T. Zeyheri Sond., var. *hirsutissimus* Schinz, l.c.

T. terrestris L., var. *Zeyheri* Schinz, in Bull. Herb. Boiss. II, 187 (1894).

T. Zeyheri Sond., var. *aurantiacus* Dinter, in Fedde Rep. XXIV, 15 (1927).

T. murex Schlechter ex Dinter, in Fedde Rep. XXIV, 14 (1927), nomen subnudum, non Presl, pro parte; Range, in Fedde Rep. XXXVI, 249 (1934).

A prostrate perennial. Branches prostrate or at length somewhat ascending, radiating from the much branched crown of the rootstock, up to 1 metre long (sometimes even exceeding this length but usually very much shorter) and branched again, more or less hirsute in all vegetative parts with a fine indumentum, with scattered bristle-like bulbous-based hairs; internodes very variable in length, depending on the robustness of the plant, up to 9 cm. long, usually much shorter, striate, terete. Leaves unequal; the larger up to 9 cm. long, up to 9-jugate; the smaller up to 5 cm. long, up to 4-jugate; stipules up to

10 mm. long, usually much shorter, narrowly linear-lanceolate to obliquely ovate, acute, ciliate with tubercle-based hairs, more or less pubescent on both surfaces; petiole not winged; leaflets obliquely oblong, acute or ovate acute to slightly obovate abruptly acute, very variable in size and shape, from 4–20 mm. long and 2–11 mm. broad, more or less densely pubescent on both surfaces sometimes almost glabrous on the upper surface and very often conspicuously ciliate with bulbous-based hairs. *Pedice*l $1\frac{1}{2}$ to 2 times as long as the subtending leaf. *Flower-buds* ovate, obtuse or acuminate, up to 8 mm. long. *Sepals* narrowly linear-lanceolate, acute, up to 12 mm. long and 2 mm. broad, unusually densely pubescent without. *Petals* broadly cuneate, up to 25 mm. long, 1.7 to 2.5 times the length of the sepals. *Filaments* up to 3.5 mm. long; anthers up to 3 mm. long. *Style* usually fairly short; stigma slender, pyramidal, about $2\frac{1}{2}$ mm. long, much exceeding the style in length. *Intrastaminal glands* united to form a shallow cup at the base of the ovary. Carpels and young fruit minutely pubescent and hirsute with bristle-like hairs. *Mature fruits* armed or almost devoid of spines, extremely variable in size and shape, at length breaking up into 5 cocci; cocci usually armed with 4 (–6) well developed spines, or spines very much reduced as to give the coccus almost a warted appearance, tubercled on the dorsal crest and very often laterally compressed (Fig. VI).

DAMARALAND.—Grootfontein: Jan., *Lightfoot*, 63; Febr., *Seiner*, 674; Jan., *Schoenfelder*, 488. At Gaub: *Borle*, 50. Okahandji: *Dinter*, 143, 303; *Bradfield*, 412; *Hopfner*, 53, 52. Swakopmund: *Bradfield*, 581; *Lüderitz*, 148. bei Ukib: *Dinter*, 60; *Pogge*, 15. Ongwati: *Engler*, 6191. Salem: *Dinter*, 110. Karibib, *Hartman*, 155a, 155c pro parte; *Mücke*, 7. Auasberge: *Dinter*, 1888. Windhuk: *Rogers*, 29766. Rehoboth: *Fleck*, 150, 592. Kuiseb-bed: *Fleck*, 776.

GREAT NAMAQUALAND.—Gibeon: *Pearson*, 9212. Sandverhaar: *Range*, 942. Kuibis: *Range*, 897. Aus: *Schäfer*, 156; *Schinz*, 1121. Huibplateau: *Schenck*, 207, 211. Holoog: *Pearson*, 4120. Aias: *Pearson*, 8039. Klein Karas: *Örtendahl*, 250. Choaberib: *Pearson*, 9461.

CAPE PROVINCE.—Namaqualand: Rietfontein, *Pearson*, 3434. Kamabies: *Pearson*, 3780. Springbok: *Godman*, 689; *Salter*, 4577. Calvinia: Springbokkuil, *Zeyher*, 272 (type in Herb. Mus. Bot. Stockholm). Calvinia: *Marloth*, 10487. Gordonias: Upington, *Wagner*, s.n. Askam: *Lang*, s.n. Laingsburg: Matjesfontein, *Foley*, 192. Graaff Reinet: Kruidfonteinhoogte, *Bolus*, 836. Prieska: *Bryant*, J.21, J.39, J.19. Hopetown: Orange River nr. Hopetown, *Bolus*, 1836; *Rehmann*, 3336. Herbert: St. Clair, Douglas, *Orpen*, 124. Kimberley: Witpan, *Pocock*, s.n. Barkly West: *Benim*, 607. Groot Boetsap: *Marloth*, 1133. Likat: *Wilman*, s.n. Winters Rust: *Wilman*, s.n. Kuruman: 50 miles from Kuruman, *Lang*, s.n. Batlharos: *Silk*, 15.

ORANGE FREE STATE.—Fauresmith: *Henrici*, 2557.

TRANSSVAAL PROVINCE.—Zoutpansberg: Blaauwberg: *Bremekamp* and *Schweickerdt*, 120. Mapagoni: *Breyer*, in *Hb. Transv. Mus.*, 16044. Messina: *Rogers*, 19373, 19401, 18422; *Scholtz*, 1. Zoutpan: *Obermeyer*, *Schweickerdt* and *Verdoorn*, 263, 299. Waterpoort: *Obermeyer*, *Schweickerdt* and *Verdoorn*, 325. Lydenburg: Sekukuni, *Barnard*, 186.

Sonder in *Fl. Cap.* I. i.e. based his description of the above species on one gathering only; i.e. *Zeyher* 272 from Springbokkuil, Little Namaqualand. Examination of the type numbers of this species in various herbaria suggested that it is an annual, the crown of the rootstock not being strong enough to give one the impression of a perennial species. Sheets such as *Pearson* 3780, 3015, 9212 and 3434, and *Marloth* 1133 which are good matches with the type, however, have rootstocks in which the crown exhibits the presence of remains of dry shoots from an earlier season. Observations of this species in the field in the sandy areas of the northern Transvaal (during the month of November) showed the presence of persistent rootstocks (with the remains of withered and dried branches) giving rise to young flowering shoots. This species is thus undoubtedly perennial but very probably may reach the flowering stage within a year.

Sonder's type is undoubtedly a specimen which grew under unfavourable circumstances. In endeavouring to find a match with this type among more recently gathered material it was found that stunted and dwarfed plants such as *Pearson* 3780 and *Marloth* 1133 approached the type most closely, whereas more robust gatherings such as *Dinter* 303 and *Pole Evans* 1, at first sight, did not appear to belong to this species. Furthermore, luxuriant specimens such as *Schweickerdt* and *Verdoorn* 650, and *Obermeyer*, *Schweickerdt* and *Verdoorn* 299 at first sight appeared wholly out of place in this species. Careful examination of vegetative, floral and fruit characters, however, have subsequently shown, that all these exhibit such a wide range of variation that a sub-division based on these characters would amount to the description of individual plants as species. It therefore became obvious that owing to the great variation in the specimens examined, the adoption of a broad view of the species seemed the only one possible.

From the appearance of the specimens examined, the notes made by different collectors and from my own observations of plants in the field, it appears that the habit of this species is a fairly constant one: the primary branches arising from the crown of the rootstock are prostrate and towards their extremity may be ascending, but the species never tends to become shrubby as in *T. exarucians* Wawra. It is by this character (supported by others less conspicuous) that these two species may be distinguished.

A study of the characters of the vegetative and reproductive organs, i.e. length of internodes, size of leaflets, degree of indumentum, relative and actual size of calyx and corolla, nature of the fruit, etc., showed *T. Zeyheri* to be an extremely variable species, the limits of which are not at all clearly defined. In fact it is only with great difficulty and uncertainty that it may be distinguished from *T. cistoides* L. *Sonder* l.c. states that *T. cistoides* is "much more robust and has larger leaves, flowers and fruits, besides a style 2 lines long and a short terminal stigma, by which character as already stated by *Schlechtendal Bot. Zeit.* 1851, p. 844, it is known from other *Tribuli*." This statement holds good for *Sonder's* type and a few modern gatherings of stunted plants which are in no way truly representative of the species. As soon as a broader view of the species is adopted it is a matter of difficulty to distinguish our South African species from the American *T. cistoides* L. Examination of material of the latter from America, Cape Verde Islands and Tropical Africa, etc., has shown that in many cases the style is extremely well-developed and the stigma very much reduced; in other cases, however, a pyramidal well-developed stigma and consequent reduction in the length of the style is exhibited by the American plants. The character of relative size and length of style and stigma thus does not hold good as a means of distinction between *T. Zeyheri* and *T. cistoides*. The shape of the leaflets, however, appears to be more satisfactory, viz. in *T. cistoides* they tend to be oblong to obovate-oblong apiculate, whereas in *T. Zeyheri* they tend to be more or less oblong or ovate-oblong. The fruits of these two species do not exhibit any constant differences.

From the foregoing observations it is assumed that these two species are closely related. Whereas extreme forms of these species may be readily distinguished, occasions arise when one is rather somewhat in doubt as to the identity of a plant especially when it has come from an area where both species overlap, i.e. some parts of Tropical Africa.

To take a restricted view of the above species would not further the position in any way. It would merely mean that certain individuals would have to remain unclassified. To regard *T. Zeyheri* and *T. cistoides* as being conspecific would amount to extending the limits of the species too considerably. *Oliver* in *Fl. Trop. Afr.* I. 283 (1868) considers *T. cistoides* L. to be a variety of *T. terrestris* L. This is very unlikely to be true for the following reasons. The flowers of *T. terrestris* L. (from Southern Europe) possess intras-taminal glands which are free and not joined to form a definite cup around the base of the ovary, whereas *T. cistoides* L. shows the presence of this cup. This characteristic appears to be of great taxonomic importance as in the many sheets examined I have always been able to distinguish *T. terrestris* L. (including *T. parvispinus* Presl and *T. murex* Presl) from the other South African members of this genus.

Schinz l.c. after having studied a large number of specimens from the Mandate of South West Africa, arrives at the conclusion that *T. Zeyheri* is to be regarded as a variety of *T. terrestris* L. I cannot agree to this view on the grounds that *T. Zeyheri* has intergrown intrastaminal glands whereas in *T. terrestris* these are free. Schinz furthermore states that he had not yet seen *T. cistoides* from Africa, but regards all plants so-named from that continent to be *T. Zeyheri*. In Herb. Kew., however, several sheets from Tropical Africa undoubtedly belong to *T. cistoides* L., in fact they resemble the typical South American form of that species.

Dinter, in *Deutsch-Südwest-Afrika* l.c. states that *T. Zeyheri* differs from *T. terrestris* only in the very large flowers and which are extremely variable in colour. This fine collector evidently overlooked the nature of the intrastaminal glands.

Engler, *Veg. der Erde* l.c. considers *T. cistoides*, *T. terrestris* and *T. Zeyheri* to be distinct and from a phylogenetic point of view equivalent species. He distinguishes *T. Zeyheri* from *T. cistoides* in the following characters: *T. cistoides* has smaller flowers, broader sepals and larger fruits than our plant. These characters appear to be of little or no taxonomic value since I have examined many sheets of *T. Zeyheri* with flowers smaller and fruits larger than those of the American species.

Dinter, in *Fedde Rep. XXIV* l.c. again stresses the variation in colour of the flowers which can be either uniformly yellow, cream with a saffron claw or more rarely, uniformly cream, and in the region of the Aviser Pforte nr. Windhoek very frequently orange-yellow to orange-red. On the basis of the latter colour he distinguishes var. *aurantiacus* Dtr. l.c. from the typical plant. I very much doubt whether this represents a distinct variety and for the present am inclined to consider it synonymous with *T. Zeyheri* Sond.

Schinz's varieties *hirtus* and *hirsutissimus* of *T. Zeyheri* are in my opinion only extremely hairy individuals of the typical plant. I do not consider degree of indumentum to be of any taxonomic importance.

T. murex Schlechter l.c. definitely falls within the range of *T. Zeyheri*. Dinter 110 which bears "typ. auct." in Schlechter's hand has extremely spiny fruits and it was no doubt on the basis of this character that Schlechter had intended to separate it from *T. Zeyheri*.

The fruits of *T. Zeyheri* appear to vary markedly in their degree of spinosity. Bradfield 581 and Dinter 303, both from South West Africa, exhibit fruits which are extremely spiny and in this respect are not unlike immature fruits of the Australian *T. hystrix* R. Br. The fruits of Bryant J. 21, Mücke 52, Schoenfelder 488 and Steyn 22566 again present the other extreme in which the cocci are laterally much compressed and warted on the dorsal crest; the spines are short and rigid. In fact the fruits of the specimens just mentioned appear so typical, that may be on the basis of this character it would be possible to regard them as a species distinct from *T. Zeyheri*. It will be necessary, however, to grow plants from such seed before any conclusions are arrived at. Another most interesting gathering is that of Bryant J. 39 (see also under *T. pterophorus*) which has fruits partly devoid of spines and in which the cocci are sharply tubercled as well as having two slender downward turned spines arising from near the base of each coccus. These fruits are not unlike the figure representing *T. Zeyheri* in Engl. l.c. (True *T. Zeyheri* Sond. possesses fruits in which each coccus is armed with four well-developed spines.)

Until an intensive study of the various variations outlined above has been made in the field in conjunction with breeding experiments, it will be impossible to say whether several varieties or even species are involved under the present concept of *T. Zeyheri* Sond., or whether this species is only one *extremely variable* species. The distribution is a much wider one than that of any of the large-flowered South African species. It is found mainly in the sandy arid and sub-arid regions of Southern Africa and occurs further north through South Tropical Africa, finally overlapping with *T. cistoides* L. in the Tropics proper.

5. *T. terrestris* Linn., Sp. Pl. 387 (1753); Thunb. Prodr. 79 (1794); Thunb. Fl. Cap. ed. Schult. 543 (1823); DC. Prodr. I. 703 (1824); Eckl. & Zeyh. Enum. Pl. 95 (1835); Harvey, Gen. S. Afr. Pl. 46 (1838); Drège Zwei Pflzgeogr. -Doc. 58, 73, 131 (1843); Krauss in Flora 1844, p. 301; Sonder, Fl. Cap. I. 352 (1859-1860); Harvey, Gen. S. Afr. Pl. ed. II. 36 (1868); Engl. et Gilg., in Warburg Kunene-Samb.-Exped. Baum: 269 (1903); Dinter, Deutsch-Südwest-Afr. 85 (1909); N. E. Brown in Kew Bull. 1909, p. 97; Heering & Grimme, Untersuch. Weideverh. Deutsch-Südwestafr. 26, 74 (1911); Glover, in Ann. S. Afr. Mus. IX, iii, 170 (1913); Engler, Veget. der Erde 9. III. i. 736 (1915), cum fig. 343, E-L; Juel, Plant. Thunberg, 309 (1918); Burt Davy, Flow. Pl. & Ferns I. 187 (1926); Dinter, in Fedde Rep. XXIV. 15 (1927); Engler, Pflzfam. ed. 2. 19a. 176 (1931), cum fig. 84 E-L; Range, in Fedde Rep. XXXVI. 250 (1934).

Syn.: *T. terrestris* β . *desertorum* Eckl. and Zeyher, Enum. Plant., 95 (1835).

T. hispidus Presl, Bot. Bemerk., 29 (1844).

T. murex Presl, l.c.

T. parvispinus Presl, l.c.

T. terrestris L., var. δ . *desertorum* Sond., Fl. Cap. I, 353 (1859-60).

T. terrestris L., var. β . *hispidissimus* Sond., Fl. Cap. I, 353 (1859-60); Burt Davy, Flow. Pl. and Ferns I, 187 (1926).

T. parviflorus Schlechter ex Engler, Pflzfam. ed. II, 19a, 176 (1931), nomen tantum.

T. murex Schlechter ex Dinter, in Fedde Rep. XXIV, 14 (1927) pro parte, nomen subnudum, non Presl; Range, in Fedde Rep. XXXVI, 249 (1934).

A spreading prostrate usually decumbent *annual*. Branches radiating from the much-branched crown of the rootstock, up to 1.5 metres long and usually branched again, in all vegetative parts pubescent, villous or hispid or glabrescent, extremely variable as to degree of hairiness; internodes up to 6 cm. long, usually much shorter, terete, striate. Leaves unequal; the larger up to 6 cm. long, usually somewhat smaller, with up to 8 pairs of leaflets; the smaller up to 3.5 cm. long, usually much smaller, with up to 6 pairs of leaflets; leaflets obliquely oblong-lanceolate, or lanceolate-ovate, acute or subobtuse, villous on both surfaces, often more or less glabrescent above, up to 15 mm. long and 5 mm. broad, usually much smaller; stipules linear or linear-lanceolate, acute, up to 10 mm. long, often much shorter. Pedicel shorter, as long as or more rarely slightly longer than the subtending leaf. Flower buds ovate-acuminate or acute. Sepals 3-6 mm. long, linear-lanceolate, acute, villous without. Petals broadly cuneate, clear yellow, 3-12 mm. long, shorter than or up to 2.3 times the length of the sepals. Filaments 3 mm. long or somewhat longer. Style short, much reduced; stigma hemispherical and almost sessile on the ovary; ovary hirsute with bristly bulbous-based hairs. Intrastaminal glands not intergrown to form a cup around the base of the ovary. Mature fruit pubescent or almost glabrous, at length breaking up into 5 cocci; cocci usually with 2 lateral divergent acute spines inserted above the middle, and two shorter spines directed downwards and inserted near the base of the cocculus; dorsal crest tubercled and usually set with bristly hairs; the size and degree of spinosity of the cocci is extremely variable (Fig. VII).

ANGOLA.—Mossamedes: Höpfner, s.n. On the Kubango at Kalolo: Baum, 441.

AMBOLAND.—Ondonga: Liljeblad, 188; Rautanen, s.n. Olukonda: Schinz, 1022, 1023, 1025.

DAMARALAND.—Okahandja: Dinter, 143; Seiner, 150. Windhuk-Walfishbay: Rogers, 15179. Salem: Dinter, 102. Windhuk: Trotha, 81a. Karabib: Hartman, 155b, 155c pro parte, 155d. Lichtenstein: Dinter, 4489. Rehoboth: Fleck, 4, 65.

GT. NAMAQUALAND.—Kubub: Range, 226; Schinz, 1024. Schakalskuppe: Pearson, 4784. Sandverhaar: Pearson, 4675. Seeheim: Pearson, 3723. Naruda-süd: Pearson, 7862, 8218.

CAPE PROVINCE.—Little Namaqualand: Steinkopf, *Schlechter*, s.n. Stinkfontein: Pearson, 5521. Calvinia: Springbokkuil, *Zeyher*, 273. Clanwilliam: *Bachmann*, 332. Nr. Wupperthal: *Drège*. Cape: Claremont, *Schlechter*, 553. Nr. Salt River stn.: *Salter*, 240/11. Nr. Lakeside stn.: *Andreae*, 229. Robertson: Montagu, *Moss*, 5593. Riversdale: Gauritz River: *Ecklon* and *Zeyher*, 751B. Mossel Bay: *Moss*, 5593. Knysna: *Burchell*, 1841; *Fourcade*, 1993. Uitenhage: *Ecklon* and *Zeyher*, 751. Bathurst: Fish River, *Burke*. Komgha: *Flanagan*, 82. Willowvale: Bashee, river mouth and in gardens, *Drège*. Queenstown: Shiloh, *Baur*, 973. Graaff Reinet: *Bolus*, 261. Prieska: *Bryant*, J. 39 pro parte. Hay: Asbestos Hills, *Wilman*, 3041. Herbert: Belmont, *Wilman*, *Orpen*, 125, 126. Kimberley: *Wilman*, 2124. Riverton: *Wilman*, 3041.

NATAL PROVINCE.—Ladysmith: Wagon Hill, *Wood*, 18781. Zululand: *Gerrard*, 214.

ORANGE FREE STATE PROVINCE.—Fauersmith: *Henrici*, 1873, 2461, 2462, 2532–2534, 2559–2561, 2676, 2678, 2704–2706, 2708, 2710–2712, 2718–2719; *Verdoorn*, 1561–1563; *Goossens*, 654; *Steyn*, 22565. Bloemfontein: Bestersput, *Welts*, 22. Modderivierdrift: *Rehmann*, 3586. Kroonstad: Bothville, *Schweickerdt*, 1075, 1080. Vredefort: *Obermeyer*, in *Tol. Mus.*, 31665.

TRANSVAAL PROVINCE.—Potchefstroom: *Burt Davy*, 854. Vereeniging, *Leendertz*, 5862. Witwatersrand: Johannesburg, *Moss*, 7469, 9557, 13779, 16146, 16171. Pretoria: Wonderboompoort, *Smith*, 6192; *Schweickerdt*, 1049, 1050. Rooikop: *Smuts* and *Gillett*, 2029. Meintjes Kop: *Mogg*, 12307; *Schweickerdt*, 1202. Rustenburg: *Nation*, 42 *Watt* and *Brandwyk*, 1813. Waterberg: Nylstroom, *Mogg*, 12535. Zoutpansberg: *Messina*, *Turner*, 18.

BASUTOLAND.—Leribe: *Dieterlen*, 127. White Hill: *Jacottet*, 236.

BECHUANALAND PROTECTORATE.—Mafeking: *Bolus*, 6402. Mochudi: *Rogers*, 6443. Kwebe (Ngamiland): *Lugard*, 105, 117, 123.

PORTUGUESE EAST AFRICA.—Ressano Garcia: *Schlechter*, 11896. Rikatla: *Junod*, 440. Lourenco Marques: *Moss*, 11806, 6947; *Thoday*, 176; *Monteiro*, 56. Inhambane: *Lawrence*, 31.

For reasons of space it has been impossible to cite all the specimens seen. Consequently gatherings for citation were selected mainly with a view to indicate the wide distribution of this species in South Africa. As a result of studying a very wide range of material from almost all parts of Southern Africa, the writer has come to the conclusion that among the various species of *Tribulus* found in the area under consideration, *T. terrestris* Linn. show the widest range of variation both in vegetative and reproductive characters.

T. murex Presl, *T. parvispinus* Presl and *T. hispidus* Presl based on scanty material are very probably only forms of the cosmopolitan *T. terrestris* L.

T. parvispinus Presl has petals and sepals 2–5 mm. long and in many cases the sepals exceed the petals in length. The ratio of length of petals to sepals may thus be represented by the factor 1.0 or a value less than 1.0.

In *T. murex* Presl the petals vary between 5–12 mm. and sepals 4–6 mm. in length. The ratio of the length of petals to sepals here has a value of 1.25–2.3 and appears to be always greater than 1.0. The flowers appear to be somewhat larger than those of *T. parvispinus*, but specimens have been examined in which the flowers approached in size those of the species just mentioned.

In the type and type numbers of *T. hispidus* Presl the petals have been eaten by insects (probably already at the time of gathering) but judging from the remains they appear to exceed the sepals in length. The very hispid nature of the plant to my mind is merely due to habitat, it does not appear to be of any taxonomic value, since it is not correlated with other distinctive characters.

An attempt to distinguish *Presl's* species from each other on basis of the relative ratios of length of petals to sepals has proved unsuccessful especially as the Linnean type of *T. terrestris* in some respects appears to be intermediate between these species.

The Linnean type of *T. terrestris* is a complete plant having about 5 branches each of which is more or less 8 cm. long. The petals are about 3 mm. long and the sepals being hidden by the former are somewhat shorter than the petals. The leaves are 4-6 jugate, and the pedicels are as long as or slightly shorter than the subtending leaves; the leaflets are up to 7 mm. long and 3 mm. broad. The young fruits are minutely puberulous (apart from the bristly hairs on the dorsal crests) and each coccus is armed with two pairs of lateral spines of which one pair is shorter than the other.

[As a note of interest the following may be mentioned: *Linnaeus* wrote up his type (sheet 4 in the cover of *Tribulus*) as *Tribulus* ∇ which actually means *T. aquaticus*. In the manuscript of the Sp. Pl., however, he correctly wrote *Tribulus* ≠ the latter sign being used by him to denote "earth," i.e. *terrestris*. By mistake the sheet was thus actually written up wrongly, but this has no bearing on *Tribulus aquaticus* C. Bauh. which is quite a different plant, namely *Trapa natans* (see Richter's Index)].

Taking various standard works on the Floras of Central Europe, North America and Australia into account, one finds that the limits by which these various authors define *T. terrestris* L. show wide discrepancy. Some define the petals as being "3-4 mm. long," some state "6 mm. long" and others again "up to 10 mm. long," the length of the sepals also exhibits this wide range of variation. There is thus very little doubt with regard to the extreme variability of this species.

It has been pointed out that the *Linnean* type has extremely small flowers. What *Presl* has described under the name *T. parvispinus* is to my mind typical *T. terrestris* L. The fruit characters on which he distinguishes his species from the Linnean plant do not hold good. A wide range of material has shown the size, etc. of the fruits to be extremely variable. For analogous reasons *T. murex* Presl and *T. hispidus* Presl are considered to be merely large-flowered and more robust forms of *T. terrestris* L.

Dinter 102 quoted in Fedde Rep. XXIV. 14 (1928) under *T. murex* Schlechter is nothing else but *T. terrestris* L. Furthermore *T. parviflorus* Schlechter ex Engler l.c. is *T. terrestris* L.

Miss I. C. Verdoorn of the Division of Plant Industry, Pretoria, who has had occasion to study plants in the field and especially on the lands of the Grootfontein School of Agriculture, Middelburg, Cape Province, recognised three closely allied forms of *Tribulus*, (a) small plants with erect dried-up looking (greyish) inward-curling branches, (b) plants with longer branches which were inclined to be prostrate, (c) luxuriant plants with closely prostrate branches. Miss Verdoorn kindly prepared herbarium specimens of these forms all of which have since been identified by the writer as being *T. terrestris* Linn. These forms could not be regarded as varietally different on basis of their habitat, since the latter was not correlated with any other morphological difference. The small erect "form" was suspected of having caused "dikkop" in sheep.

Dr. M. Henrici, who has grown plants at the Veld Reserve, Fauresmith, O.F.S., states: "At least four species seem to exist according to habit of growth and flowers: (1) a widely spreading plant with a large yellow dark-centered flower, (2) a running variety with a large evenly coloured yellow flower smaller than that of (1), (3) medium sized yellow flower with calyx about half as long as petals, both running and upright forms; when the species runs, calyx may be nearly as long as the petals, (4) small yellow flower with calyx as long as or longer than the petals, running and upright forms. The two latter species have forms not only differing in their habit of growth but also in their content of green pigment. While some of the forms are excellent fattening fodder plants, those which grow upright and contain less pigment cause dikkop at times, especially in the wilted state and on certain soils (limestone and river bank soils). It seems that the species with large flowers and large amounts of pigment and with long runners are never poisonous."

The plants mentioned under (1) and (2) are definitely not *T. terrestris* L. but very probably *T. Zeyheri* Sond. or one of the species with winged fruits. Since the nature of the fruits is not mentioned it is impossible to say which of these species are involved. The plants under (3) are probably luxuriant forms of *T. terrestris* L. (= *T. murex* Presl) and those under (4) almost certainly the typical small-flowered Linnean species. It may be added that according to a note by Blank on a sheet of *T. pterophorus* Presl in Herb. Mus. Bot. Berol., this large-flowered prostrate species has been found to cause "geelsiekte" in sheep (see notes under *T. pterophorus*). Thus not only the small-flowered species are to be suspected of being poisonous to sheep.

T. terrestris L. makes its appearance soon after the first summer rains have fallen and often forms extensive dense carpet-like growths near the habitations of man.

Owing to the ruderal and semi-ruderal nature and the wide (almost cosmopolitan) distribution of this Linnean species it is readily conceivable that under different edaphic and climatic conditions the plants may present a very variable appearance. Careful breeding experiments would do doubt throw light on the question as to whether *T. terrestris* L. as conceived in this paper is only one extremely variable species or whether at present several closely allied species are included under this name.

CONCLUDING REMARKS.

That distinguished systematists such as Engler, Schinz and Dinter had failed in defining the limits of the various species clearly, in spite of the fact that each of these authors had travelled and collected extensively in Southern African regions where *Tribulus* abounds, may serve to indicate how ill the members of this genus are defined.

A successful and clear delineation of the Southern African species may be possible by taking recourse to special field studies including the growing of plants from seed and the conduction of breeding experiments. A clear conception of the range of variation exhibited by any one species may be obtained in this way.

It is furthermore a *sine qua non* that thorough gatherings be made of such mother plants in both flowering and fruiting condition of which the seed is intended to be grown. Such mother plants must be retained for future reference and as a standard for comparison with the cultivated daughter plants. The mere growing of plants from seed without having preserved specimens of the mother plants from which the seed had been derived is not of much use, since it is absolutely essential that the nature of the original plant in its wild state be known.

The most satisfactory and profitable method of procedure appears to be the following: As many different forms of species such as for example *T. pterophorus*, *T. Zeyheri* and *T. terrestris*, including specimens of these species from their type localities (where such are known) and which have been found to resemble the type, should be gathered and their seeds should be grown under identical as well as different conditions (climatic and edaphic). Gatherings should again be made of both flowering and fruiting material of these daughter plants. By subsequent comparison of these individuals possibly an insight may be gained into what at present is considered to be an individual but very variable species.

ACKNOWLEDGEMENTS.

It has been my privilege to examine the material in all the South African Herbaria as well as the Southern African material in the following European Herbaria: Hort. bot. Reg. Kew., Mus. Brit., Mus. bot. Berol., Mus. bot. Stockholm, Mus. bot. Univ. Germ. Prag., Mus. bot. Univ. Zürich and Hofmuseum, Wien. I wish to tender my sincere thanks to the Directors and Curators (Keepers) of these various institutions for allowing me to consult this material. My special thanks are due to Sir Arthur Hill, Director of the Royal Botanic Gardens, Kew, for the great facilities offered during the preparation of this paper.



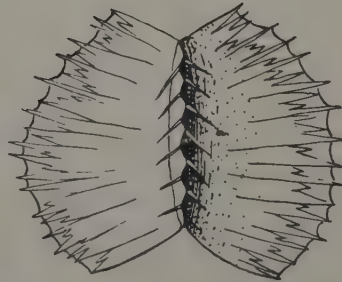
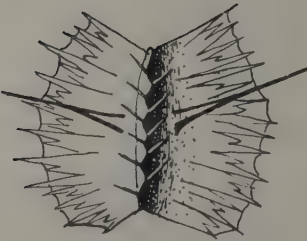
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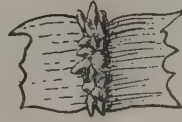
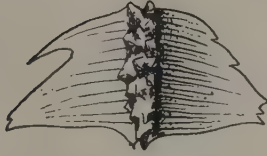
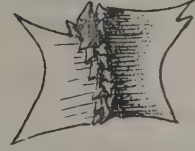
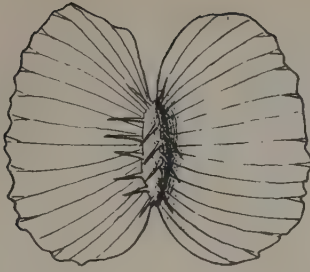
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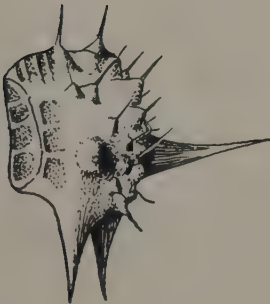
IV



V



VI



VII

EXPLANATION OF FIGURES.

- I.—Ovary of *T. terrestris* L. ($\times 10$).
II.—Ovary of *T. Zeyheri* Sond. ($\times 10$).
III.—Cocci of *T. excrucians* Wawra ($\times 3$).
IV.—Cocci of *T. cristatus* Presl ($\times 2$).
V.—Cocci of *T. pterophorus* Presl ($\times 2$).
VI.—Cocci of *T. Zeyheri* Sond ($\times 3$).
VII.—Cocci of *T. terrestris* L. ($\times 3$).

A NOTE ON THE SOUTH AFRICAN SPECIES OF *XIMENIA* LINN. AND THEIR POSSIBLE ECONOMIC USES.

By H. G. SCHWEICKERDT, B.Sc., Ph.D., F.L.S.

DURING the past seventeen years spasmodic interest has arisen in connection with the possible use of the fruits of species of *Ximenia* as a source of oil. In 1917 the Imperial Institute reported on a sample of fruits said to be those of *X. americana* Linn. Last year Mr. A. G. S. du Toit, the Extension Officer at Ixopo, Natal, sent in specimens of a *Ximenia* (National Herbarium No. 16694) accompanied by a large sample of fruits, with a request for any information as to their economic value. Mr. du Toit in his letter stated that the plant grows on very poor dry land—practically useless for any other plant of value and that the fruits could be gathered in large quantities. In South Africa we have two species of *Ximenia* which have always been confused and because of the interest taken in the plants, it was thought desirable to clear up the confusion, as it was important to know which of the two species were investigated and reported on by the Imperial Institute. The work was commenced at the National Herbarium, Pretoria and completed at the Herbarium, Royal Botanic Gardens, Kew.

Oliver in the Fl. Trop. Afr. 1, p. 346 (1868), mentions one species, *X. americana* L. and one variety, *X. americana* var. *microphylla* Welw. Sonder in the Fl. Cap. 1, p. 234 (1859), likewise mentions only one species *X. caffra* Sond. and one variety, *X. caffra* var. *natalensis* Sond. The fundamental difference between *X. americana* L. (and the variety *microphylla* Welw.) and *X. caffra* Sond. (and the variety *natalensis* Sond.) may be found in the type of inflorescence.

The following diagrammatic drawings may serve to illustrate the morphology of different types of inflorescences met with in the South African species and varieties of *Ximenia* L. For the sake of clarity these diagrams have been somewhat exaggerated especially with regard to the dimensions of the abbreviated shoots (B) in Figs. I. II. III.

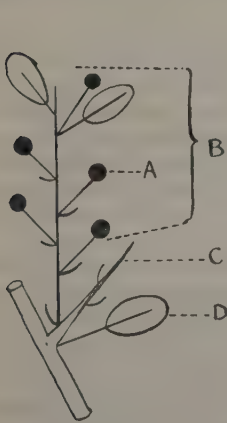


FIG. I.

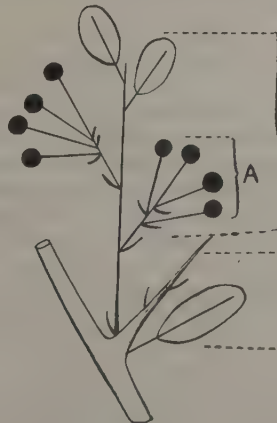


FIG. II.

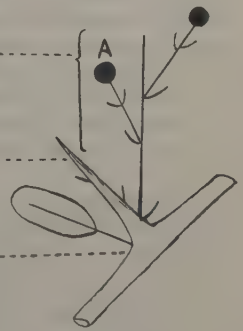


FIG. III.

In *X. americana* the inflorescence is always a stalked axillary few- to many-flowered bracteate cyme. In *X. americana* var. *microphylla* the inflorescence is also a few-flowered stalked and bracteate axillary cyme: occasionally however, the flowers may be solitary, but then the peduncle is always bracteate, thus suggesting a reduced inflorescence. In *X. caffra* and *X. caffra* var. *natalensis*, however, each flower arises singly in the axil of either a scale-like leaf or in the axil of a normally developed leaf: the pedicels are never bracteate. A number of these flowers usually arise on one and the same much abbreviated lateral shoot thus forming an axillary fascicle. By the foregoing characters *X. caffra* (and its variety) may readily be distinguished from *X. americana* (and its variety).

A study of herbarium material has shown, that the inflorescence Fig. II (A), or solitary flowers Fig. I and Fig. III arise in the axils of either (i) normally developed foliage leaves, or (ii) in the axils of reduced scale-like leaves borne by shoots of limited growth (B). These dwarf shoots (B) are usually much abbreviated and consequently the fascicles of flowers in *X. caffra* (and its variety) may readily be mistaken for sessile axillary cymes. The abbreviated shoots in turn arise in the axils of either (i) normally developed foliage leaves, or (ii) in the axils of the lower scale-like leaves, on lateral branches of limited growth (C); the latter may either be so much abbreviated as to resemble warty outgrowths or may be relatively well-developed thorns. The thorns invariably arise in the axils of normally developed leaves (D). The latter may have fallen by the time the inflorescence develops, but this is by no means always the case. Furthermore the leaves on the shoots (B in Figs. I and II) do not always develop and consequently may be absent. In other cases again the bracts subtending the flowers (Fig. I) or those subtending the cymes (Fig. II) may be replaced by normally developed leaves.

Burt Davy in his Manual of Flowering Plants and Ferns of the Transvaal with Swaziland 11, p. 453 (1932) seems to have overlooked the fact that *X. americana* L. and *X. caffra* Sond. are readily distinguishable by their type of inflorescence. In fact this character is of fundamental importance in the distinction of species (and varieties) belonging to this genus.

It is therefore suggested that the following key to the Transvaal species (and varieties) be substituted for the one on page 453 of Burt Davy's manual (l.c.)

- A.—Flowers solitary in the axils of normal or scale-like leaves, or in few- to many-flowered fascicles on abbreviated branches. Flower-stalks never bracteate near the middle.....B.

Inflorescence a few- to many-flowered stalked axillary bracteate cyme, or flowers solitary arising in the axils of leaves, but then the flower-stalk always bracteate near the middle.....C.

- B.—Branchlets and leaves densely tomentose when young; lamina becoming glabrate above in age (even quite glabrous and shiny); petioles, peduncles, calyx and outer surface of the corolla pubescent, the latter at times almost glabrous...*X. caffra* Sond.

Branchlets and leaves glabrous to tomentose when young; lamina in age above and beneath glabrous, but never shiny; petioles pubescent; peduncles and calyx scantily pubescent or glabrous; corolla externally glabrous.....*X. caffra* var. *natalensis* Sond.

- C.—Leaves glabrous, but not conspicuously glaucous; lamina $3\frac{1}{2}$ – $7\frac{1}{2}$ cm. long, 2– $3\frac{1}{2}$ cm. broad; flowers 0.8–1.25 cm. long; calyx not deeply lobed; fruits $2\frac{1}{2}$ –3 cm. long, yellow when mature.....*X. americana* L.

Leaves glabrous, conspicuously glaucous; lamina up to $3\frac{1}{2}$ cm long and up to 2 cm. broad, but usually much smaller; flowers 5–6 mm. long; calyx persistently deeply lobed; fruit up to 2 cm. long, yellow when mature; plants usually very thorny.....*X. americana* var. *microphylla* Welw. ex Oliv.

According to Burt Davy l.c., *X. americana* L. occurs in the bushveld and Barberton areas of the Transvaal. Examination of specimens quoted in his manual, has proved these to belong to *X. caffra* var. *natalensis* Sond. As it may easily be seen from the above key that the latter plant is entirely distinct from *X. americana* L., Burt Davy's synonymy *X. americana* L. = (*X. caffra* var. *natalensis* Sond.) is not justified; it is merely the result of erroneous identification of specimens. Furthermore in the "Notes from the National Herbarium and Museum, Series No. 4, Journ. Dept. Agr., South Africa, January, 1925" the plant in question (Nat. Herb. No. 2840) is definitely not *X. americana* L. but *X. caffra* Sond.

All the available material from the Transvaal I have so far had an opportunity to examine, did not include any belonging to *X. americana* L. This species in its typical form apparently does not occur in the Transvaal or even in the Union of South Africa.

With regard to *X. Rogersii* Burt Davy: This species is described by Burt Davy in his Manual 11, p. xxxv (l.c.). A description of the inflorescence is not given. Examination of the type specimen (Rogers 22569 in Herb. Kew.) showed, that it agrees perfectly with the type of *X. americana* var. *microphylla* Welw. ex Oliver (Welwitsch 1127 in Herb. Mus. Brit.). Burt Davy does not, however, quote this variety as a synonym of his species *X. Rogersii*. Whether the plants placed in *X. Rogersii* and therefore also those placed in the variety of *X. americana* are sufficiently distinct from *X. americana* to constitute a separate species is at present difficult to say. They are undoubtedly closely allied to that species and the only character by which they may be readily distinguished appears to be the difference in length of the petals of the flowers. Until more complete material, better field-notes and a much wider range of material can be studied it is perhaps more satisfactory to retain *X. americana* var. *microphylla* Welw. ex Oliver in preference to *X. Rogersii* Burt Davy. It is also suggested that the enumeration of species and varieties of *Ximelia* L. on p. 453-454 of Burt Davy's Manual be modified as follows:—

- (1) *X. caffra* Sond.
- (2) *X. caffra* var. *natalensis* Sond.
- (3) *X. americana* var. *microphylla* Welw. ex Oliver = (*X. Rogersii* Burt Davy).

The fruits sent to the Imperial Institute in 1934 were those of *X. caffra* var. *natalensis* (National Herbarium 16694) and examination of the herbarium material now proves that the samples of fruits examined by the Imperial Institute in 1917, were not those of *X. americana* but of *X. caffra* (National Herbarium 2840).

The following is an extract from the report of the Imperial Institute:—

"As previously mentioned it seems unlikely that the oil could be prepared by pressing the kernels, and solvent extraction would be necessary. The oil obtained in the present case by extraction with light petroleum resembled the similarly-prepared oil from the *X. americana* (i.e. *X. caffra*) kernels in being viscous and cloudy, and in containing an appreciable quantity of a rubber-like constituent, the presence of which would account for the high viscosity of the oil. Such oil could not be used for edible purposes and would probably prove unattractive for the manufacture of soap in competition with other readily available oils. Its comparatively low iodine value indicates that it would be unsuitable for use in paint and varnish-making. The acetone-extracted oil, on the other hand, proved to be practically free from the objectionable rubber-like substance. It might therefore prove more suitable for soapmaking and possibly, after refining, for edible use. The value of such oil at the present time would, however, be only about £13 to £14 per ton in the United Kingdom. The residual meal is rich in proteins, but feeding trials carried out in Germany on several kinds of animals with the residual meal of *X. americana* kernels are stated (*Der Pflanze*, 1911 7, 486) to have shown that the meal is not well suited for use as a feeding-stuff. The present meal would probably give similar results, but feeding trials would be necessary

to determine this point. In this connection it may be pointed out that the meal left after extraction with acetone would contain most of the rubber-like constituents of the kernels, and this might affect its suitability for use as a feeding-stuff. Owing to the inferior quality of *Ximenia* kernels in comparison with other oil-seeds and in view of the current over-production of vegetable oils generally and the consequent low price of these commodities, it does not appear likely that under existing conditions it would be profitable to exploit *Ximenia* kernels as a source of oil, except possibly for local markets. It may be mentioned in connection with any effort which may be made to utilise *Ximenia* oil in South Africa, that the kernels can be readily extracted from the dry fruits by treatment in a Miller's palm-nut cracking machine, and subsequent separation by means of sieves and an air-blast such as are employed in machines used in the preparation of palm kernels."

A NEW SPECIES OF *PACHYSTIGMA* HOCHST. FROM TRANSVAAL.

By PROF. DR. W. ROBYNS, Brussels (Belgium).

THE genus *Pachystigma* has its centre of dispersion in South Africa. Of the ten known species, only two are to be found in Southern Rhodesia : *P. rhodesianum* (S. Moore) Robyns, which is limited to that country and the very poisonous *P. pygmaeum* (Schlecht) Robyns, a native of South Africa but extending into Southern Rhodesia.

Several species show that suffrutescent habit which is so commonly met with in South Africa,* but others are dwarf shrublets or erect and more or less branched shrubs of 2-4 m. high, as *P. Bowkeri* Robyns and *P. macrocalyx* Robyns. The second species is perhaps the most variable of the whole group in its vegetative characters as a result of response to local conditions. Amongst rocks, it shows the dwarf squat habit with short internodes and small subtomentose more or less fulvous leaves (*forma rupicola*), whereas on the edge of forests, it develops into a much branched shrub with elongated internodes and large puberulous green leaves (*forma silvicola*). The extreme forms of this species look so different that one may easily be inclined to consider them as two distinct species, but the differences seem to be only of degree, no qualitative characters being available.

The new species from Northern Transvaal described here through the courtesy of Dr. E. P. Phillips, Principal Botanist, Pretoria, who kindly sent the herbarium specimens for examination to Brussels, is, according to the collector's label, a small tree of about 5 m. (15 feet) high. Its affinities are with *P. macrocalyx* on account of the habit and the long calyx lobes. It may be incorporated in the key I have published in 1928† as follows :—

Folia utrinque tomentosa vel rarius dense appresse pilosa ; alabastra ut calycis lobi pubescentia :

Folia anguste elliptica, tantum usque ad 1 cm. lata ; cymae distincte pedunculatae, peduncuo 3-5 mm. attingente :

Frutices nani ; folia 3 cm. longa et 1 cm. lata, cyanescentia pilosaque ; cymae 3-5-florae ; calycis lobi lineares, vix tertiam partem superiorem alabastrorum attingentes..... coeruleum

Arbores parvi, breviter ramosi ; folia usque ad 1.7 cm. longa et 0.8 cm. lata, cinereo-tomentella ; cymae 3-florae ; calycis lobi anguste elliptici et alabastra plus minusve aequantes..... triflorum

Folia rotundata, ovato-rotundata vel elliptico-rotundata, semper ultra 1 cm. lata ; flores subfasciculati vel rarius ad cymas brevipedunculatas referentes ; calycis lobi lineari-obtusi et alabastra aequantes vel superantes..... macrocalyx

* cf. *J. Burtt Davy*.—The suffrutescent habit as an adaptation to environment. *Journ. of Ecology*, X, p. 211 et sqq. (1922).

† *W. Robyns*.—Tentamen Monographiae Vangueriae Generumque affinium. *Bull. Jard. Bot. Etat Brux.*, XI, p. 119 (1928).

Pachystigma triflorum Robyns sp. nov., ex affinitate *P. macrocalycis*, sed habitu, foliis ellipticis multo minoribus et calycis lobis ellipticis primo visu distinctum.

Arbor parva, secundum collectores ± 5 m. alta, multo sed breviter divaricate ramosa; rami ramulique oppositi, cylindracei, cortice cinereo interdum subdeciduo obteeti, glabri; ramuli novelli breves, oppositi, divaricati, teretes, internodiis brevibus vel usque ad 6-8 mm. attingentibus, dense cinereo-tomentelli. *Stipulae* subherbaceae, brevissime vaginato-connatae, subito 0.5-2 m. longe filiformi-subulatae, omnino cinereo-tomentellae, vix scariosae et demum deciduae. *Folia* ad nodos ramorum hornotinorum opposita, mox decidua, breviter petiolata, petiolo 1-1.5 mm. attingente et griseo-tomentello; laminae rigide herbaceae, anguste ellipticae, basi breviter attenuatae, apice plus minusve late obtusae, statu sicco marginibus saepe recurvatis, 1-1.7 cm. longae et 0.5-0.8 cm. latae, utrinque tomentellae sed leviter discolores, pagina superiore leviter glaucescentes at pagina inferiore cinerascens, costa media pagina inferiore distincte prominente, costis secundariis inconspicuis. *Cymae* as nodos ramorum annotinorum plerumque defoliatorum insertae, plerumque oppositae, divaricatae, simplices, typice triflorae sed saepe abortu biflorae vel etiam uniflorae, bracteolatae, omnino cinereo-tomentellae, in toto 1.5-1.8 cm. attingentes, distincte pedunculatae, pedunculo crassiusculo et 3.5 mm. longa. *Flores* mediocres, 3.5 mm. longe pedicellati; alabastra oblonga, distincte apiculata, circa 6-7 mm. longa et dense pubescentia; calycis lobi sub anthesin plus minusve patententes, anguste elliptici, apice obtusi, 6 mm. longi, utrinque tomentelli; corollae tubus cylindricus, ± 2.5 mm. longus, extus dense pubescens, intus medio annulo pilorum reflexorum instructus, lobi lanceolati, apiculati, ± 4 mm. longi quorum 1.5 mm. pro apiculis, extus breviter pubescentes et intus carnosuli; antherae subsessiles, lanceolatae, breviter apiculatae, 1.25 mm. attingentes; stylus gracilis, e basi sensim attenuatus, ± 4.5 mm. altus; stigma cylindricum, apice distincte 5-lobatum, irregulariter costatum, ± 1 mm. longum; discus annularis, glaber; ovarium hemisphericum, ± 1 mm. altum, tomentellum et 5-loculare. *Fructus* pedicello elongato suffultus, globosus, apice calycis lobis auctis coronatus, ± 6 mm. diametro (an maturus?), sicco nigricans, sparse puberulus, 5-pyrenus.

SOUTH AFRICA.—North-Transvaal: Waterberg, Olifant's Poort, at 9 miles north of Nylstroom, in bush on rocky kopje, rare, tree of about 5 m., flowers pale greenish yellow, December, 1934, *Galpin*, 13198 (typus floriferus) (Herb. Pretor. et Herb. Brux.); Zoutpansberg Range, January, 1925, *Smuts*, in *Nat. Herb.*, 19796 (typus fructiferus) (Herb. Pretor.).

Observation.—This new species can easily be distinguished by the xerophytic habit, the ashy-coloured leaves, the typical 3-flowered cymes and the form and length of the calyx-lobes.

A REVISION OF THE SOUTH AFRICAN SPECIES OF *HELITOTRICHON*, *Bess. ex Schultes.*

By H. G. SCHWEICKERDT, B.Sc., Ph.D., F.L.S.
(With 12 Figures.)

I.—INTRODUCTION.

THE most elaborate account of the South African species of this genus is that by *Stapf*, in *Dyer, Fl. Cap. VII.* 472–477 (1899) under the name *Avenastrum* Jess., where a fairly broad view of the species was taken.

Stapf did not consult the actual type specimens of *Steudel* and *Nees ab Essenbeck*, but based his identifications on the study of type numbers. For purposes of study he furthermore had only a comparatively narrow range of material at his disposal. During the last few years, however, a fair amount of material has accumulated in various South African herbaria. Because of this and the foregoing reasons, the author of the present paper found it desirable to undertake a revision of the genus with a view to elucidating several remarks made by *Stapf* in his account of the genus.

In this revision the material of several of the larger European and the more important South African herbaria has been included.

II.—HISTORY OF THE GENUS.

The generic name *Helictotrichon* Bess. first appears in *Schultes Mant. Syst. Veg. ii. Addit. I.* 526 (1827) and most probably is merely a revised spelling of the earlier name *Elictotrichon* Bess. ex Andr. [*Rys. Bot.* p. 9 (1823)]. The latter appeared in a list of plants as *Elictotrichon sempervirens* Bess. unaccompanied by any description and being a *nomen nudum* must thus be rejected.

At a date subsequent to the publication of the name *Elictotrichon sempervirens*, *Besser* communicated to *Schultes* a new classification of *Avena* and *Trisetum* in which he proposed several new genera, including *Helictotrichon*. As *Besser* had already used the name *E. sempervirens* for *Avena sempervirens* Host. and as the latter was also the first species to be listed under *Helictotrichon*, *Avena sempervirens* Host. naturally is the type species of the genus.

The name *Avenastrum* first appeared as a *section* to the genus *Avena* L. in *Koch, Syn. Fl. Germ. et Helv.* ed. 1. 795 (1837). This *section* was subsequently used in the same sense by authors such as *Benth.* and *Hooker* [*Gen. Pl.* iii. 1160 (1883)], *Hackel* [*Engl. Pflzfam.* ii. 2. 56 (1887) et *True Grasses*, 123 (1896)], *Aschers.* and *Graebner* [*Syn. Mitteleurop. Flor.* ii. 243 (1899)], *Hitchcock* [*Man. Grass. Un. States*, 297 (1935)], and as a *subgenus* by *Rouy* [*Fl. France*, XIV, 126 (1913)].

Jessen, in *Deutsch. Gräser*, 214 (1863) put forward the name *Avenastrum* as a genus and included under it species such as (1) *Avena flavescens* L., (2) *Avena elatior* L., (3) *Aira caryophyllea* L. and (4) *Aira praecox* L. He thus not only raised *Koch's* sectional name

to generic rank, but modified its sense appreciably by including in it the heterogenous elements quoted above. The name and genus *Avenastrum* Jessen is superfluous since *Jessen* had included under it the older valid names and genera *Trisetum* Pers. (1805) [for (1) above] and *Arrhenatherum* Beauv. (1812) [for (2) above] and for this reason must be rejected as a "*nomen illegitimum*."

Beck [Fl. Nieder.-Öst. 1. 72, in Ann. Nat. Hofmuseum. Wien V. 560-561 (1890)] recognised the genus *Avenastrum* Jess. but restricted its use and conceived it generically in the sense that *Koch* used it sectionally, i.e. differing only from *Koch's* conception in rank. The genus is used in the same restricted sense by *Stapf* [Dyer, Fl. Cap. VII, 472 (1899)] where strictly speaking the genus is *Avenastrum* Jess. pro parte.

Apparently *Beck* did not consider the genus *Heuffelia* Schur. [Enum. Pl. Transs. 760 (1866)] under which *Avena* sect. *Avenastrum* Koch [Syn. ed. 2. 918 (1844)] is cited as a synonym. *Avena pratensis* L. was included in this genus as well as in *Helictotrichon* Besser and on this account *Heuffelia* Schur. is congeneric with the older genus i.e. *Helictotrichon* Besser.

It may be pointed out that the name *Helictotrichon* Bess. is not an orthographic variant of *Helictotrichum* Nees (1818) as the former was derived from the adjective *helictos*, whereas the latter was derived from the noun *helix* and on this account both genera have the right to stand independently.

Furthermore the name *Helictotrichum* Bess. has been taken up in the Index. Kew. from Reichenb. Fl. Germ. Excurs. 1406. no. 352 (1832) where it is considered a synonym of *Avena planiculmis* Schrad. *Benth.* and *Hook. f.* [Gen. Pl. III. ii. 1160 (1883)] and *Hackel* [Engl. Pflzfam. II. ii. 56 (1887)] quote it as a synonym under *Avena* sect. *Avenastrum* Koch. It is probably only a misprint for *Helictotrichon* Bess.

III.—DESCRIPTION OF THE GENUS.

Helictotrichon Bess. ex Schult. Mant. Syst. Veg. ii. Addit. I. 526 (326 errore) (1827).

Spikelets narrowly-oblong to oblong or elliptic-oblong, laterally compressed, usually erect or suberect, of medium size (8-15 mm. long, rarely smaller or larger), in nearly always erect often stiff panicles, rarely nodding. *Rhachilla* disarticulating above the glumes and between the valves, produced into a short bristle beyond the uppermost floret or ending with a rudimentary lemma: rhachilla-internodes glabrous, or short- or long-hairy, 1.5-4 mm. long. *Florets* 2-6, ♂, or the uppermost more or less reduced. *Glumes* 2, persistent, hyaline or subhyaline, subequal or unequal, acute or acuminate, more or less distinctly keeled: the lower 1-3-nerved: the upper 3-7-nerved (3-nerved in the South African species). *Lemmas* usually distinctly exserted from the glumes, rarely subincluded, more or less herbaceous with scarious or hyaline tips, often rather firm, at length becoming indurated, acute or acuminate, bifid (rarely 4-fid), with or without bristles from the lobes, 5-11-nerved, awned; awn dorsal, from the middle or slightly above the middle of the lemma, kneed and twisted (at times spuriously) below the bend: callus short or elongate, villous. *Paleas* shorter than the lemmas, 2-keeled, ciliate. *Lodicules* 2, rather large, hyaline. *Stamens* 3. *Ovary* hairy from above the middle or at the apex only: styles distinct, short; stigmas usually laterally exserted, plumose. *Caryopsis* oblong, slightly laterally compressed, usually grooved in front, hairy at the apex, pallid, soft, embraced by the hardened lemma and palea: hilum linear, up to half the length of the grain; embryo small. *Caespitose* perennials: leaf blades linear, usually narrow, flat or convolute, sometimes setaceous; ligules hyaline or scarious; panicle narrow, more rarely diffuse, erect or nodding.

Species about 65; mainly natives of the temperate regions of the northern hemisphere, but also occurring on the mountains of Java, extending through the high mountain regions of tropical Africa to South Africa.

IV.—KEY TO THE SPECIES.

A.—Rhachilla-internodes from 2·5–4 mm. long, densely bearded for the greater part of their length :

B.—Inflorescence very compact, composed of numerous spikelets :

C.—Lemma with prominently raised nerves, finely granular between but not on the nerves ; callus $1-1\frac{1}{4}$ mm. long ; glumes narrowly lanceolate, prominently nerved and hyaline..... 1. *quinqusetum*.

CC.—Lemma not prominently nerved, often scabrous at the insertion of the awn but smooth dorsally below it, and minutely scaberulous towards the margins, distinctly so towards the apex of the lobes ; callus $1\frac{1}{4}-2$ mm. long ; glumes broadly lanceolate, not very prominently nerved, not sub-hyaline 2. *longum*.

BB.—Inflorescence short, lax to very lax, composed only of relatively few spikelets :

D.—Plants about 30 cm. high. Lemma about 1·0 cm. long (excluding the bristles), distinctly coarsely granular on the back in the dorsal middle third, granules also present on the nerves..... 3. *namaquense*.

DD.—Plants about 80 cm. high. Lemma slender, about 1·5 cm. long (excluding the bristles), smooth dorsally, not prominently nerved, very minutely scaberulous near the margin in the upper half, slightly scaberulous along the nerves.. 4. *barbatum*.

AA.—Rachilla-internodes 1·5–2·5 mm. long :

E.—Rachilla-internodes glabrous, smooth, acute, hardly dilated at the apex ; lobes of lemma (above insertion of the awn) about 10 mm. long or slightly longer..... 5. *leoninum*.

EE.—Rhachilla-internodes bearded and dilated near the apex ; lobes of lemmas up to 8 mm. long, but usually much shorter :

F.—Lemmas scabrid or scaberulous :

G.—Florets scarcely exerted beyond the glumes ; glumes broadly lanceolate ; outer surface of lemmas minutely scaberulous all over..... 6. *Galpinii*.

GG.—Florets exerted well beyond the glumes ; glumes lanceolate ; lemmas scabrid mainly at the insertion of the awn :

H.—Lemmas about 10 mm. long ; rhachilla-internodes 2 mm. long..... 7. *capense*.

HH.—Lemmas about 7 mm. long ; rhachilla-internodes about 1·5 mm. long..... 8. *kirtulum*.

FF.—Lemmas glabrous on the back below the point of insertion of the awn :

I.—Lemmas about 7 mm. long ; column of awn with 1–3 twists..... 9. *natalense*.

II.—Lemmas usually 10 mm. long or somewhat longer ; column of awn with more than 3 twists :

K.—Leaves many from the base of the culms, setaceous and up to 40 cm. long ; spikelets usually gaping ; rhachilla-internodes long-hairy and usually evident..... 10. *longifolium*.

KK.—Leaves not setaceous, often convolute. Rhachilla-internodes usually not readily evident :

L.—Glumes broadly lanceolate ; lemmas lanceolate in profile ; lobes (above insertion of awn) 3-5 mm. long ; anthers 1 mm. long, rarely 2 mm. in some florets ; cleistogamous ?..... 11. *turgidulum*.

LL.—Glumes lanceolate, acuminate ; lemmas narrowly lanceolate, slender in profile ; lobes (above insertion of awn) 6-8 mm. long ; anthers 1.5-2 mm. long..... 12. *Dodii*.

V.—ENUMERATION OF THE SPECIES.

1. H. *quinesetum* (Steudel) Schweickerdt, comb. nov.

Syn. : *Avena quineseta* Steudel, in Flora, 1829, 485 ; Kunth., Enum. I, 305 (1833). *Trisetum Steudeli* Nees, in Linnaea, VII, 308 (1832) ; Fl. Afr. Austr., 349 (1841) ; Steudel, Syn. Pl. Glum, i, 228 (1854) ; Dur. and Schinz, Consp. Fl. Afr., V, 840 (1894).

Avenastrum quinesetum Stapf, in Dyer, Fl. Cap., VII, 474 (1899).

Culms 50-75 cm. high, glabrous, 2-4-noded, sheathed to 5-10 cm. below the panicle. *Leaves* 4-6, arising from near the base, 2 higher up ; lowest sheaths somewhat compressed, firm, minutely puberulous, strongly nerved, the upper more terete and glabrous ; ligule truncate, irregularly laciniate, up to 3 mm. long ; blades linear, with callous tips, flat or conduplicate, up to 25 cm. long and 4 mm. wide, the upper usually much shorter, rigid, strongly and closely nerved, glabrous. *Panicle* contracted, rather dense and almost spike-like, narrow, 12-18 cm. long, straight or subflexuous ; branches fascicled, very unequal, branched from near the base, adpressed to the rhachis ; the longest up to 5 cm. long. *Spikelets* 12-18 mm. long, very loosely 2-sub-3-flowered. *Glumes* narrow-lanceolate, acuminate, prominently nerved, glabrous, scarious along the margin and towards the apex : the lower 8-11 mm. long and about $1\frac{1}{2}$ mm. broad ; the upper 10-13 mm. long and $1\frac{1}{2}$ -3 mm. broad. *Rhachilla-internodes* $3\frac{1}{2}$ - $4\frac{1}{2}$ mm. long, acute, slightly broadened towards their apex, slender, hairy almost to the base with white spreading hairs up to 4 mm. long. *Lemmas* shortly exserted, linear-lanceolate, the lowest (including callus and lobes, but excluding the awn) up to 18 mm. long, pallid, rather firm, with prominently raised nerves, glabrous below the insertion of awn, finely granular between the nerves up to the base of the valve : lobes 10-12 mm. long, finely scaberulous and scarious towards the apex ; each lobe usually terminating in 2 bristles of unequal length (termination of veins). *Callus* subulate, up to $1\frac{1}{4}$ mm. long, densely bearded with hairs about $1\frac{1}{2}$ mm. long ; awn inserted \pm 7 mm. from the base of the valve ; column 8-10 mm. long ; bristle up to 18 mm. long. *Palea* about 9 mm. long ; keels prominently ciliolate. *Anthers* $2\frac{1}{2}$ mm. long. *Ovary* pubescent for the greater part of its length.

CAPE PROVINCE.—Table Mountain, near Capetown, Ecklon, 929 ! without precise locality, Harvey, 295 !

This species appears to be very rare ; it is represented in most herbaria only by duplicates of the type gathering (Ecklon, 929). The type specimen of *Avena quineseta* Steudel is deposited in the *Fielding Herbarium, Oxford*.

2. *H. longum* (Stapf) Schweickerdt comb. nov.

Syn.: *Trisetum antarcticum* Nees, Fl. Afr. Austr. 346 (1841) pro parte, exclud. syn. pro parte; in Linnaea, XX, 254 (1847), not in Linnaea, VII, 307 (1832).
Trisetum longifolium Nees, Fl. Afr. Austr., 347 (1841), pro parte.
Avena longa Stapf, in Kew Bull., 1897, 292.
Avenastrum longum Stapf, in Dyer, Fl. Cap. VII, 473 (1899).
Avenastrum longum Stapf, var. *grande* Stapf, l.c.

Culms 60–110 cm. high, glabrous, about 3-noded, sheathed almost up to base of inflorescence. *Leaves* 3–6 from near the base, and usually 3 higher up along the culm; sheaths rather loose; the lower persistent, usually glabrous, strongly striate; the upper glabrous or more or less densely pubescent with reflexed short hairs; ligules conspicuous, 3–5 mm. long, truncate, usually somewhat torn; blades linear to linear-lanceolate, tapering to a fine point, 15–30 cm. long, very variable in width, 2.5–10 mm. wide, flat or involute, flaccid, glabrous, smooth or rough above, markedly striate. *Panicle* contracted or somewhat interrupted, linear, linear-oblong or oblong, 20–30 cm. long, nodding and flexuous, or fairly straight and robust; branches fascicled, very unequal; the longest up to over 5 cm. long, branched from near the base or simple, filiform, flexuous, scaberulous. *Spikelets* up to 30 mm. long (including the bristles of the lemmas), usually about 20 mm. long, 4–5 flowered. *Glumes* lanceolate, acuminate; the lower 6.5–9 mm. long, 1-sub-3-nerved; the upper 9–12 mm. long, 3-nerved. *Rhachilla-internodes* 2.5–3 mm. long, bearded throughout with hairs up to 3 mm. long. *Lemmas* rather firm, pallid, sometimes purplish, up to 18 mm. long (including the bristles but excluding the awn), not conspicuously nerved, minutely granular on the back below the insertion of the awn, sometimes scabrid along the margins; lobes beyond the insertion of the awn about 10 mm. long, scabrid. *Callus* 1.25–2 mm. long, long-bearded. *Awn* inserted about 8 mm. distant from the base of the lemma; column 6–9 mm. long; bristle 15 mm. or somewhat longer. *Palea* about 7 mm. long, inconspicuously ciliolate. *Anthers* 2.5–3 mm. long. *Ovary* puberulous in upper half.

The type specimen (*Zeyher*, 1807) is deposited in the *Kew Herbarium*.

CAPE PENINSULA.—Cap. b. Spei, *Bergius*, 228! In humidis planib. Capens. atque dunarum, Oct., *Zeyher*, 1807, 1807b! In arenosis ad litus maris pone van Kampsbay, Oct., *Zeyher* (38?) in *Herb. Bolus*, 21723 et in *Herb. Mus. Austro-Afr.*, 19430. Kenilworth Race Course, *L. Bolus*, 15054! University grounds, Rondebosch, Nov., *Levyms*, 3674. Ottery Rd., sandy flats, *Adamson*, s.n.! Klein Slangkop, about 500 ft., *Wolley-Dod*, 3004. Camp Ground, *Wolley-Dod*, 3473. Slopes beyond Miller's Point, Sept., *Wolley-Dod*, 3003! Table Mountain, *Rogers*, 30434! Upper northern slopes of Lion's Head, *Wolley-Dod*, 3571! Orange Kloof below farm, *Wolley-Dod*, 3128! In grassy rocky places above Camps Bay, *McOwan*, 1793! Stellenbosch Div., near Firgrove, Oct. *C. Sandwith*, 147!

Among the South African representatives, this species appears to be the most robust with regard to inflorescence; in width of leaf and indumentum of the vegetative parts it appears to be somewhat variable and for this reason Stapf's var. *grande* is considered merely an extreme form which does not deserve varietal rank.

3. *H. namaquense* Schweicherdt nom. nov.

Syn.: *Trisetum Dregeanum* Steud., Syn. Pl. Geum., 227 (1854), nomen illegit.; Dur. and Schinz, Consp. Fl. Afr., V, 838 (1894).
Trisetum barbatum Nees β *minus* Nees, Fl. Afr. Austr., 345 (1841).
Avenastrum dregeanum (Steud.) Stapf, in Dyer, Fl. Cap., VII, 473 (1899).

A densely caespitose perennial. *Culms* about 30 cm. long, slightly bulbous at the very base, glabrous, striate, slender, 1-noded; node much below the middle; sterile leafy shoots many at the base of the culms. *Leaves* about 4 from near the base of the culm, one

or two sheathing it for the greater part of its length; sheaths fairly tight, glabrous; the lower persistent and sub-membranous; the upper striate, somewhat contorted; ligule truncate, 1-1½ mm. long; blades linear with callous tips; the lower up to 10 cm. long, usually shorter and 2 mm. or less wide, flat or convolute, rigid, subglaucous, striate, hairy above, scaberulous beneath. *Panicle* suberect or nodding, 6-10 cm. long, very loose, secund; branches paired, 1-3-spiculate, very unequal, somewhat spreading, filiform, scabrid; the lowest up to 2½ cm. long. *Spikelets* 10-15 mm. long, very loosely 3-4-flowered. *Glumes* unequal, submembranous, lanceolate, acuminate; the lower 8-9 mm. long and 2 mm. broad, 1-nerved; the upper 12 mm. long, 3-3½ mm. wide, 3-4-nerved, scabrid on the main nerve. *Rhachilla-internodes* 2½-3 mm. long, bearded in the upper two thirds with hairs 4-5 mm. long. *Lemmas* long-exserted, oblong-lanceolate; the lowest ± 14 mm. long (including the setaceous lobes but excluding the awn), glabrous, pallid, firmly coriaceous, coarsely granular-scabrid on the back just below the insertion of the awn, smooth and glabrous towards the base; lobes strongly nerved, submembranous, ending in scaberulous bristles. *Callus* 1¼ mm. long, curved, bearded with hairs 2.5 mm. long. *Awn* inserted ± 5½ mm. from the base of the valve; column ± 8 mm. long; bristle ± 12 mm. long. *Palea* about 8 mm. long, linear-lanceolate, conspicuously ciliate. *Anthers* up to 3½ mm. long. *Ovary* hairy above the middle.

CAPE PROVINCE: Namaqualand, Kamiesbergen, steinige Berggegend bei Ezelsfontein, 3-4,000 ft., Nov., Drège, 2526 !

The type specimen is deposited in the *Berlin Herbarium*.

Apparently a very rare species since only this gathering is known from the European herbaria. It has apparently not been gathered again either on the Kamiesbergen or in any other locality since Drège's time.

Stapf [in Fl. Cap. VII, 474 (1899)], under *Avenastrum dregeanum* cites Drège 2625. This number is probably an error for 2526 which is the number of the type specimen of *Trisetum barbatum* Nees var. *β minus* in Herb. Nees.

Steudel [Syn. Pl. Glum. 227 (1854)] created the name *Trisetum Dregeanum*, with the intention that it should replace the name *Trisetum barbatum* Nees [Fl. Afr. Austr. 345 (1841)] which he considered to be a later homonym of *T. barbatum* Steud. [Nom. ed. II. ii. 713 (1841)]. The latter, however, is a *nomen tantum* whereas Nees' species bearing the same name was validly published. Consequently *T. barbatum* Nees may stand whereas *Trisetum Dregeanum* Steud. is a superfluous name and as such must be rejected.

In Steudel's description of *T. Dregeanum* the culms are described as being "pedali" i.e. about 30 cm. high. This obviously does not apply to *T. barbatum* Nees var. *α*, which is a much taller plant and of which I have seen the type in Herb. Nees. It applies moreover to *T. barbatum* Nees var. *β minus* Nees as I have seen both the type of the latter and the specimen of *T. Dregeanum* from the Steudel Herbarium (Paris) and have found them to agree in every respect, in fact they are part of the same gathering by Drège. It should be pointed out, however, that both these sheets represent a species distinct from *T. barbatum* Nees var. *α*.

As a result of misidentification Steudel thus inadvertently applied a new name to the wrong plant. Later authors, e.g. Dur. and Schinz, and Stapf in following Steudel have consequently also misapplied the epithet "*dregeanum*." It thus cannot be accepted to designate Nees' *T. barbatum* var. *β minus*. As this variety should be given specific rank, I have named it *H. namaquense*.

4. *H. barbatum* (Nees) Schweickhardt comb. nov.

Syn.: *Trisetum barbatum* Nees, var. — Nees, Fl. Afr. Austr., 345 (1841), non Steudel.

Densely caespitose. Culms up to 75 cm. high, with numerous sterile leafy shoots from the base, glabrous or very minutely scaberulous, slender, striate, about 2-noded; nodes

somewhat exerted. *Leaves* few from near the base of the stem, two to three upwards along the culm; lowermost sheaths submembranous, pale, striate, persistent, glabrous, finally splitting into fine fibres; upper sheaths somewhat striate, glabrous or scaberulous towards the ligule, fairly lax and somewhat contorted; ligule about 3 mm. long, irregularly fimbriate; blades narrowly linear, up to 17 cm. long, usually much shorter, $1\frac{1}{2}$ –3 mm. wide, striate, scaberulous. *Panicle* very lax, few-flowered, about 8–10 cm. long, somewhat branched; branches filiform, unequal; the lowest up to $2\frac{1}{2}$ cm. long, scaberulous, each bearing 1–2 spikelets. *Spikelets* very laxly 3–4-flowered, 14–17 mm. long. *Glumes* lanceolate; lower 8–9 mm. long, submembranous, glabrous but scaberulous along the nerves, acute; upper 14 mm. long, 3-nerved, submembranous, acute, glabrous, somewhat scaberulous along the nerves. *Rhachilla-internodes* 3–3.5 mm. long, bearded in the upper two thirds with white hairs 5–6 mm. long. *Lemmas* 16 mm. long (including the bristly lobes, but excluding the awn), smooth on the back below the point of insertion of the awn, minutely but distinctly scaberulous along the nerves especially in region of the hyaline lobes beyond the insertion of the awn; lobes about 10 mm. long, each ending in a fine bristle. *Callus* about 1 mm. long, bearded with white hairs about 2 mm. long. *Awn* inserted about 6–7 mm. from base of valve; column of awn \pm 10 mm. long; bristles 15–17 mm. long. *Palea* 8 mm. long, not very conspicuously ciliolate. *Anthers* linear, 2–2 $\frac{1}{2}$ mm. long. *Ovary* pubescent in upper half.

CAPE PROVINCE.—Namaqualand, on the Kamiesbergen, Nov., Drège, 2572b! in *Herb. Nees*. et in *Herb. Mus. Austr.-Afric.*

The type specimen is deposited in the *Berlin Herbarium*.

Nees [Fl. Afr. Austr. 345 (1841)] cites as the type of *Trisetum barbatum* var. a gathering by Ecklon. This is probably an error as the type in *Herb. Nees*, viz. the specimen cited is a gathering by Drège.

Trisetum barbatum Steud. [Nom. ed. II. ii. 713 (1841)] is a *nomen tantum* and therefore *Trisetum barbatum* Nees, which was validly published, can stand and takes precedence over the former.

Steudel [*Syn. Pl. Glum.* 227 (1854)] renamed the above plant *Trisetum Dregeanum*, but in reality his description applies to *Trisetum barbatum* Nees var. β minus Nees which is a species distinct from *T. barbatum* Nees var. α . *T. Dregeanum* Steud. therefore must be sunk in synonymy under the above species. For further information the reader is referred to the remarks in this paper under *H. namaquense*.

H. barbatum (Nees) Schweickerdt is apparently a rare species, since in herbaria it is only represented by Drège's gathering. No other collector seems to have found this species since Drège's time.

5. *H. leoninum* (Steudel) Schweickerdt comb. nov.

Syn.: *Avena leonina* Steud., in *Flora*, 1829, 484; Kunth, *Rév. Gram.* ii, 521, t. 175 (1831); Kunth, *Enum.*, i, 303 (1833); Trin., in *Mem. Acad. Petersb.*, Ser. VI, Sc. Nat., IV, ii, 29 (1836).

Danthonia leonina Steud. ex Kunth, *Enum.*, i, 303 (1833), in syn.

Trisetum antarcticum Nees, in *Linnaea*, VII, 307 (1832), pro parte, non Trin.

Avenastrum antarcticum Stapf, in *Dyer*, *Fl. Cap.*, VII, 476 (1899), pro parte.

Densely caespitose with numerous barren shoots. *Culms* up to 50 cm. high, usually somewhat shorter, glabrous, 2–3-noded, internodes included or exerted. *Leaves* mainly from near the base; sheaths terete, fairly tight, glabrous or with spreading fine hairs, strongly striate; lowermost persistent and eventually splitting into fibres; upper somewhat compressed, not slipping off the culms; ligule about $1\frac{1}{2}$ to 2 mm. long, irregularly dentate; blades linear, flat, tapering to a callous point, up to 10 cm. long, but usually much shorter, up to 3 mm. wide, glabrous or scantily pubescent, markedly nerved. *Panicle*

contracted, linear, erect, stiff or somewhat flexuous, up to 10 cm. long, often much shorter; lower branches in pairs, unequal in length; the longer up to 4 cm. long and 2-3-spiculate, scaberulous. *Spikelets* 3-5-flowered, 12-14 mm. long, greenish. *Glumes* lanceolate, acuminate, unequal, glabrous; margins and apex scarious; the lower $5\frac{1}{2}$ -7 mm. long, narrow; the upper $7\frac{1}{2}$ -9 mm. long. *Rhachilla-internodes* $1\frac{1}{2}$ -2 mm. long, gradually tapering to an acute point, never widened at the apex, usually glabrous but very rarely with a few scattered hairs near the apex. *Lemmas* 12-14 mm. long (including callus and lobes, but excluding the awn), coriaceous, dorsally scaberulous, decreasing in scabrosity towards the lobes above the insertion of the awn; lobes 9-10 mm. long, with scarious margins. *Awn* inserted about $5\frac{1}{2}$ mm. from the base of lemma; column 7-9 mm. long; bristle \pm 13 mm. long. *Callus* 1 mm. long, clothed with short hairs. *Palea* conspicuously ciliolate. *Anthers* 2 mm. long. *Ovary* pubescent in the upper half.

CAPE PROVINCE.—Cape Peninsula: Table Mountain, *Pappe*, pro parte! Lion's Head Mountain, *Ecklon*, 928! and *Zeyher*, 101! Signal Hill, nr. Lion Battery, *Wolley-Dod*, 2747! Field below Prince of Wales Blockhouse, *Wolley-Dod*, 1474! 1477! Orange Kloof, below Constantia Nek, Oct., *Bolus*, 14667! Near Maitland Stn., Oct., *Wolley-Dod*, 3167! Alongside Pipe Track, Orange Kloof, Oct., *F. Bolus*, s.n.! Under Pine Trees, Signal Hill, Aug., *Levyms*, s.n.!

On account of the glabrous acute rhachilla-internodes this well-defined species taxonomically occupies a singular position among the South African representatives of the genus.

6. *H. Galpinii* Schweickerdt, spec. nov.; affine *H. turgidulo* (Stapf) Schweickerdt, sed lemmatibus omnino scaberulis distinguitur.

Syn.: Phillips, in Ann. A. Afr. Mus., XVI, i, 343 (1917), sub. *Avenastrum turgidulum* Stapf.

Gramen perenne, dense caespitosum. *Culmi* erecti, usque ad 60 cm. alti, graciles; 2-3-nodes, paniculis et nodis superioribus exsertis, glabri laevesque, striati, ad basin ramis foliatis. *Vaginae* pubescentes, infimae striatae, demum in fibras fissae, superiores striatae, vix glabrae. *Ligula* fere 1.5 mm. longa. *Laminae* erectae, fere rigidae, lineares, 12-16 mm. longae, nonnunquam breviores, in acumen callosum productae, planae vel leviter involutae, 2.5-3 mm. latae, subtus pilis fere dense munitae, supra sparse pubescentes et valde striatae. *Panicula* leviter contracta, 10-16 cm. longa, angusta; rhachis glabra laevisque, apicem versus nonnunquam scaberula; rami fasciculati, inaequales, usque ad 3.5 cm. longi, erecti, scaberuli, 2-4-spiculati. *Spiculae* 3-4-florae, floribus vix exsertis, 8-10 mm. longae, erectae. *Glumae* subaequales, tota facie scaberulae (vel minute pubescentes), valde striatae, subhyalinae, purpureo-pictae; inferior 9 mm. longa et 2 mm. lata, 3-nervis, late lanceolata; superior 10.5 mm. longa et 3 mm. lata, 3-nervis, late lanceolata. *Internodia* rhachillae fere 1.25 mm. longa, apicem versus pilis 3 mm. longis valde barbata. *Lemmata* usque ad 8.5 mm. longa, 5-nervia; arista 4 mm. basin lemmatis inserta, tota facie minute scaberula; lobi 4-4.5 mm. longi, scabri, in setas scabras producti. *Callus* pilis 2 mm. longis barbatus. *Aristae* columna 5 mm. longae. *Paleae* dorso tertiis partibus superioribus scaberulae, carinis ciliolatis. *Antherae* 2 mm. longae. *Ovarium* 1.25 mm. longum, apicem versus dense villosum.

CAPE PROVINCE.—Barkly East distr., at an altitude of 9,700 feet (2,900 metres) on Ben McDhui (Wittebergen), March, *Galpin*, 6902, pro parte (type deposited in *Nat. Herb. Pretoria* and in the *Kew Herbarium*).

A species which appears to be well-defined by the subincluded florets, the lemmas of which are minutely scaberulous on the outer surface.

Galpin's gathering 6902 is a mixture of the above species and typical *H. turgidulum* (Stapf) Schweickerdt; the latter may, however, be readily distinguished by the glabrous lemmas.

7. *H. capense* Schweickerdt spec. nov.

Syn.: *Avenastrum antarcticum* Stapf, in Dyer, Fl. Cap., VII, 476 (1899), pro parte. affine *H. hirtulo* (Steud.) Schweickerdt, sed paniculis laxioribus, spiculis majoribus, lemmate minus scabrido, rhachillae internodio longe brabato differt.

Gramen perenne, dense caespitosum. *Culmi* erecti, usque ad 100 cm. alti, glabri, circiter 3-nodes, nodis exsertis et basin versus ramis foliatis. *Vaginae* striatae, glabrae vel minute puberulae, inferiores demum in fibras fissae, superiores fere laxae. *Ligula* circiter 0.75 mm. longa. *Laminae* filiformis vel anguste lineares, nonnunquam involutae, usque ad 25 cm. longae, subtus glabrae vel minute scaberulae, supra pilis sparse praeditae. *Panicula* erecta vel leviter flexuosa, usque ad 20 cm. longa; rhachis glabra; rami inaequales, fasciculati, filiformis, leviter flexuosi, usque ad 4 cm. longi. *Spiculae* circiter 15 mm. longae, 4-5-florae. *Glumae* inaequales, lanceolatae, acuminatae, subhyalinae, valde nervatae; inferior fere 5.5 mm. longa; superior fere 7-9 mm. longa, dorso apicem versus minute scaberula. *Lemmata* usque ad 12 mm. longa, lineari-lanceolata, pallida, firma, dorso valde vel leviter scabra; lobi fere 6 mm. longi, minute scaberuli, in setis scabris producti. *Arista* fere 5 mm. basin lemmatis inserta; columna 4-5 mm. longa. *Internodia* rhachillae 2 mm. longa, apicem versus dilatata, pilis 3 mm. longis dense barbata. *Paleae* 5.5 mm. longae, carinis ciliolatis. *Antherae* 2 mm. longae. *Ovarium* apicem versus villosum.

The type specimens are deposited in the *Kew Herbarium* and in *Nat. Herb. Pretoria*.

CAPE PROVINCE.—Cape Peninsula: Table Mountain, *Pappe*, pro parte!. Kalk Bay Mountain, *Bolus*, 14652!. Riversdale distr.: Zoetmelksrivier, *Burchell*, 6694!. East London distr.: East London, May, *Ratray*, 720!. Gonubie, Sept., *Dyer*, 2053!. Komgha distr.: near Komgha, *Flanagan*, 935 (type)!. Kentani distr.: Among tall valley grasses, *Pegler*, 2057!. King Williamstown distr.: Nahoon River, near Kei Road Station, Nov., *Galpin*, 8244!. Near Cemetery, Nov., *Sim*, 2803!.

NATAL PROVINCE.—Durban: Clairmont, *Schlechter*, 3089!.

The plants placed under this species bear a close resemblance to *H. hirtulum* (Steud.) Schweickerdt and are often confused with that species. *H. capense* has, however, larger spikelets and the panicle tends to be somewhat more open than that of the allied species.

8. *H. hirtulum* (Steud.) Schweickerdt comb. nov.

Syn.: ?*Avena hirta* Schrad., in Goett. Gel. Anz., iii, 2075 (1821); Schult. Mant, pt. ii, 374 (1824).

Avena symphicarpa Trin. ex Steud., Nomencl., ed. ii, i, 173 (1840), nomen tantum.

Avenastrum antarcticum Stapf, in Dyer, Fl. Cap., VII, 476 (1899), pro parte. *Trisetum hirtum* Nees, Fl. Afr. Austr., 350 (1841), non Trin.; Linnaea, XX, 254 (1847).

Trisetum hirtulum Steud., Syn. Pl. Glum, i, 228 (1854); Dur. and Schinz, Conspect. Fl. Afr., V, 838 (1894).

A weak perennial with several barren shoots between the culms. *Culms* up to 100 cm. long but usually very much shorter, terete, glabrous, 2-3-noded: upper internodes exserted. *Leaves* few near the base, soon dying off, higher up somewhat distant; sheaths persistent; the lower soon breaking up into fibres, glabrous; the upper pubescent with reflexed hairs or glabrous, fairly light, terete; ligule about 1 mm. long, irregularly dentate; blades narrowly linear, tapering to an acute point, often involute, up to 25 cm. long, subrigid or flaccid, glabrous or hairy, finely nerved, smooth or scaberulous. *Panicle* contracted, linear, erect

or somewhat flexuous, 10–20 cm. long, branched; lower branches usually in pairs, of unequal length; the longer up to 5 or 6 cm. long. *Spikelets* up to 10 cm. long, 3–5-flowered. *Glumes* unequal, acute; the lower narrowly lanceolate, glabrous, almost hyaline, 1-nerved, $3\frac{1}{2}$ –6 mm. long; the upper broadly lanceolate, narrowed at the base, glabrous, hyaline towards the margins and apex, 3-nerved, up to 7 mm. long. *Rhachilla-internodes* $1\frac{1}{2}$ –2 mm. long, widened and flattened towards the apex, acute, clothed in the upper part with hairs 1·5–2 mm. long, glabrous in the lower part. *Lemmas* exserted beyond the glumes, lanceolate, acuminate, dorsally scabrous especially below the point of insertion of the awn; the lower 7–8½ mm. long; the upper somewhat shorter; lobes hyaline, setaceous, glabrous. *Awn* inserted $3\frac{1}{2}$ –4½ mm. from the base of the valve: column 5–7 mm. long. *Callus* of lemma very short, inconspicuous, bearded with hairs about 0·5 mm. long. *Paleae* hyaline, conspicuously and markedly ciliolate along the keels, about 6–6½ mm. long. *Anthers* $1\frac{1}{2}$ –2 mm. long. *Ovary* pubescent in upper half.

The type specimen indicated below is deposited in the *Berlin Herbarium*.

CAPE PROVINCE.—Cape Peninsula: Rondebosch, University Grounds, *Levy*, 3560!, 3669!. Caledon distr.: Zwartberg, near the Hot Springs, 1,000–2,000 ft., *Ecklon* and *Zeyher*, 4553!. Albany distr.: Near Grahamstown, *McOwan*, 1302!. Kalksteinrücken auf der Höhe des linken Buschmann-flusses Ufer, *Zeyher*, 143!. Grahamstown, Apr., *Daly*, 150, 152.! Botha's Hill, *Dyer*, 1480!. Bathurst distr.: Trappes Valley, Dec., *Daly*, 678.! Alexandria distr.: Urwälder bei Olifantshoek am Bosjesman-rivier, *Ecklon*, s.n. (type)! Queenstown distr.: Fincham's Nek, 4,000 ft., *Galpin*, 3281!.

This species is allied to *H. capense*, but may be distinguished from the latter in being a weaker plant with smaller spikelets and having an inflorescence which usually is more contracted and spike-like than that of the allied species.

[Whether *Avena hirta* Schrad. l.c. is conspecific must remain an open question until the type specimen has been located. It is believed to be at Leningrad but so far has not been traced there.]

9. *H. natalense* Schweickerdt stat. nov.; affine *H. longifolio* (Nees) Schweickerdt, sed foliis latioribus, spiculis glumis lemmatibusque minoribus differt; affine *H. hirtulo* (Steud.) Schweickerdt, sed panicula laxiora, lemmatibus glabris distinguitur.

Syn.: *Avenastrum caffrum* Stapf, var. ? *natalensis* Stapf, in *Dyer*, Fl. Cap., VII, 477 (1899); *Medley Wood*, Natal Plants, II, tab. 191 (1904).

Gramen perenne. *Culmi* erecti, usque ad 1 m. alti, 4-nodes, infra nodes minute puberuli, graciles, nodis et paniculis exsertis. *Foliorum* vaginae striatae, minute scaberulae, pilis sparsis munitae. *Ligulae* breves, circiter 0·5 mm. longae. *Laminae* planae, vix subflaccidae, usque ad 25 cm. longae et 4 mm. latae, perraro involutae, valde striatae, subtus scaberulae supra scaberulae et pilis sparsis munitae. *Panicula* 25 cm. longa, diffusa, laxa, rhachis scaberula, filiformis; rami fasciculati, valde inaequales, usque ad 3·5 cm. longi, simplices vel parce ramosi, filiformes, flexuosi, scaberuli vel hispiduli. *Spiculae* 7–8 mm. longae, laxae 3-sub-4-florae, floribus exsertis. *Glumae* acuminatae, valde inaequales; inferior 3 mm. longa, anguste lineari-lanceolata, 1-nervis, glabra, secus carinam scaberula; superior 6 mm. longa, lanceolata, valde 3-nervis, glabra, secus carinam scaberula. *Lemmata* exserta, usque ad 8 mm. longa, lineari-lanceolata, pallida, rigida, valde nervata, dorso infra aristam minute granulata; lobi 3 mm. longi vel breviores, in setas producti, secus nervos minute scaberuli. *Arista* 4·5 mm. basin lemmatis inserta, columna breve fere 3 mm. longa. *Callus* brevissimus, breviter barbatus. *Internodia* rhachillae fere 1·5 mm. longa, apicem versus pilis 3 mm. longis barbata. *Paleae* fere 4 mm. longae, carinis conspicue ciliolatis. *Antherae* 1·5–2 mm. longae. *Ovarium* apicem versus hirsutum.

The type specimens are deposited in the *Kew Herbarium* and in the *Natal Herbarium*, Durban.

NATAL PROVINCE.—Umvoti distr.: Rietvlei, 4,000–5,000 ft., *Buchanan*, 238 (type)!. Zululand: Melmoth, Imfulazane, 4,500 ft., *Mogg*, 6089!

TRANSVAAL PROVINCE.—Belfast Distr.: Dullstroom, 6,500 ft., *Galpin*, 13008!

Although the lemmas in *Galpin* 13008 are on the whole more markedly nerved and slightly less conspicuously granulate than *Buchanan* 238, I have no hesitation in referring this sheet to *H. natalense* Schweickerdt.

Whereas all the other South African species have markedly twisted columns to the awn, this is not the case in the species in question, a character met with in the allied *Avenastrum lachnanthum* Pilger.

10. *H. longifolium* (Nees) Schweickerdt comb. nov.

Syn.: *Avena caffra* Stapf, in Kew Bull., 1897, 293.

Trisetum longifolium Nees, Fl. Afr. Austr., 348 (1841), pro parte; Steud., Syn. Pl. Glum., 228 (1854); Dur. and Schinz, Consp. Fl. Afr., V, 839 (1894).

Avenastrum caffrum Stapf, in Dyer, Fl. Cap., VII, 477 (1899); Phillips, in Ann. S. Afr. Mus., XVI, i, 343 (1917).

Densely caespitose with several sterile leafy shoots. Culms up to 90 cm. long, glabrous, 3–4-noded, sheathed to the base of the panicle. Leaves several from the base, 2–3-higher up along the culm; lower sheaths persistent, glabrous, markedly striate, breaking up into somewhat coarse fibres; upper not very tight, slightly contorted, glabrous, not markedly striate or only so towards the ligule; ligule oblong, up to 1½ mm. long; blades usually very narrow, subsetaceous, convolute; the lower up to 35 cm. long; the upper usually shorter, glabrous, strongly and closely few-nerved, with distinctly rough margins. Panicle usually lax and open, up to 20 cm. long; flexuous or slightly nodding and sub-flaccid; rhachis filiform, striate; branches fascicled, very unequal; the longest up to 5 cm. long, branched or simple, finely filiform, flexuous, scaberulous to finely hispidulous. Spikelets loosely 3–4-flowered, 8–10 mm. long. Glumes very thin, almost hyaline, strongly nerved; lower 5–6½ mm. long, very narrowly lanceolate, glabrous, acute, 1-nerved, scaberulous along the nerve; upper 8–9 mm. long, lanceolate, acuminate, 3-nerved, scaberulous along the main nerve and margins. Rhachilla-internodes usually prominently exposed, about 2 mm. long, bearded with hairs 3–4 mm. long. Lemmas exserted, linear-lanceolate; the lowest about 10 mm. long (including the lobes, but excluding the awn), glabrous, firm coriaceous, very minutely and evenly granular on the back below the insertion of the awn; lobes ± 5 mm. long, scarious, produced into short fine bristles. Callus ¾ mm. long, bearded with hairs 1½–2 mm. long. Awn inserted 5–5½ mm. from base of the lemma; column 5–8 mm. long; bristle ± 10 mm. long. Palae about 6 mm. long; keels ciliolate. Anthers 2–3 mm. long. Ovary pubescent in upper half.

CAPE PROVINCE.—Aliwal North distr.: Witte Bergen, on rocks, 7,500 ft., *Drège*, 8134! (Herb. Nees, lectotype!). Murraysburg distr.: At Snyder's Kraal, *Tyson*, 278!

ORANGE FREE STATE.—Senekal distr.: Wonderkop, frequent in moist places on upper and middle slopes of mountain, *Goossens*, 845! Doornkop, frequent on slopes of mountain, *Goossens*, 701!

BASUTOLAND.—Mafeteng distr.: Station Likhoele, *Dieterlen*, 400a! Leribe Plateau, *Dieterlen*, 967!

This species is liable to infection by a smut.

The species does not appear to occur in the south-western region of the Cape Province. Stapf's remark [Fl. Cap. VII, 477 (1899)] under *Avenastrum caffrum* is fully justified, as the sheets cited by Nees [Fl. Afr. Austr. 348 (1841)] under *Trisetum longifolium* are a mixture

of two distinct species. *Ecklon's* specimens from the dunes near Capetown belong to *Helictotrichon longum* (Stapf) Schweickerdt and in this paper are referred to that species, whereas *Drège* 8134 in Herb. Nees (Berlin) has been selected as the *lectotype* of *H. longifolium* (Nees) Schweickerdt. The specific epithet of the latter species takes precedence over that of *Avena caffra* Stapf.

11. *H. turgidulum* (Stapf) Schweickerdt comb. nov.

Syn.: *Trisetum antarcticum* Nees, Fl. Afr. Austr., 346 (1841), pro parte.

Trisetum imberbe Nees, Fl. Afr. Austr., 347 (1841); Steud., Syn. Pl. Glum., I, 228 (1854); Dur. and Schinz, Consp. Fl. Afr., V, 838 (1894).

Avena turgidula Stapf, in Kew Bull., 1897, 293.

Avenastrum turgidulum Stapf, in Dyer, Fl. Cap., VII, 474 (1899); Medley Wood, Natal Plants, II, tab. 190 (1904); Phillips, in Ann. S. Afr. Mus. XVI, i, 343 (1917).

Densely caespitose. Culms 30–100 cm. long, erect or geniculately ascending, glabrous, 2–3-noded: upper 2–3 internodes more or less exserted: uppermost often well exserted. Leaves few near the base, about 3 higher up along the culm: sheaths terete, not very tight, glabrous, puberulous or more rarely pubescent with short reflexed hairs, striate, often somewhat contorted; ligule truncate, up to 1.5 mm. long; blades linear, tapering to an acute point, up to 15 cm. long but often much shorter, up to 4 mm. broad, flat or involute, more or less rigid or subflaccid, subglaucous, glabrous, more rarely scantily hairy, scaberulous above. Panicle contracted, sometimes interrupted, erect or slightly nodding, up to 30 cm. long; branches fascicled; the longer up to 5 cm. long, branched or simple, with spikelets sub-erect or somewhat spreading, filiform, scabrid. Spikelets 10–12 mm. long, greenish, compactly 3–5-flowered. Glumes lanceolate, acuminate: the lower 5–7 mm. long, 1-nerved; the upper 7–9 mm. long, 3-nerved. Rhachilla-internodes 2 mm. long, bearded with hairs \pm 3 mm. long. Lemmas exserted, oblong-lanceolate; the lowest 7–8 mm. long, coriaceous, glabrous and finely granular dorsally below the point of insertion of the awn; lobes scarious, 4–6 mm. long. Callus about $\frac{2}{3}$ mm. long, bearded with relatively short hairs about $1\frac{1}{2}$ mm. long. Awn inserted about 5 mm. from the base of the lemma; column 5–7 mm. long; bristle 10–12 mm. long. Palea not conspicuously ciliolate, 6 mm. long. Anthers $\frac{2}{3}$ –1 mm. long, occasionally a floret with anthers up to 2 mm. long, always included and florets thus very probably cleistogamous. Ovary pubescent from the middle, hispidulous at the apex. Caryopsis $2\frac{1}{2}$ mm. long.

CAPE PROVINCE.—Uitenhage distr.: In somewhat moist places on the fields near the Zwartkops River, *Ecklon* and *Zeyher*, 463! *Zeyher*, 4551! Bathurst distr.: Trappes Valley, Dec., *Daly*, 639! Mt. Currie distr.: Kokstad, Nov., *Goossens*, 323!, 339!, 179! Ingeli Mountain, March, *Tyson*, 1270! Umtata distr.: Bazeia, Nov., *Baur*, 364! Engcobo distr.: Nqumakwe River, Jan., *Flanagan*, 2817! Between Engcobo and Nqumakwe River, Jan., *Bobus*, 10363! Queenstown distr.: Katberg, Effingham, Dec., *Galpin*, 8398! Queenstown, *Everett*, 38!, 4! Shiloh, Febr., *Baur*, 779! Reservoir east of Queenstown, Jan., *Hilner*, 3111! Rocky banks of the Klipplaat River, 3,500 ft., *Drège*! Molteno distr.: Broughton, Dec., *Flanagan*, 1673! Molteno, June, *Mogg*, 2766! Wittebergen, on Ben McDhui, March, *Galpin*, 6902 partim! Aliwal North distr.: In a depression at Leeuwenspruit, between Kraai River and the Wittebergen, *Drège*, 3918! Without precise locality, *Drège*, 4250 (*Herb. Nees*)!.

BASUTOLAND.—Leribe, 5,000 6,000 ft., *Dieterlen*, 400!, 753! Febr., *Phillips*, 6317! Mafeteng, Thaba Chicha Mountain, March, *Dieterlen*, 1275!.

NATAL PROVINCE.—Pietermaritzburg distr.: Near Maritzburg, Dec., *Medley-Wood* 7228! Klip River distr.: Umsinga, base of Biggar's Berg, *Buchanan*, 100! Umvoti distr.: Greytown, *Buchanan*, 172! Rietvlei, *Buchanan*, 156! Weenen distr.: Culvers,

Dec., *Rogers*, 28309!. Estcourt distr.: Oct., *Mogg*, 3314!. Bergville distr.: Mount aux Sources, *Bayer* and *McClean*, 272!. Tintwa Mountain, Strydhoek, Jan., *Doidge*, in *Nat. Herb.*, Pretoria, 20565!. Lions River distr.: Nottingham Road, Oct., *Galpin*, 10251!.

ORANGE FREE STATE PROVINCE.—Ladybrand distr.: Pinekloof, *Goossens*, 1044! Ficksburg distr.: Riverhill Farm, Jan., *Potts*, in *Grey Un. Coll. Herb.*, 3689!, 3690!. Senekal distr.: Senekal, Dec., *Goossens*, 815!, 821!, 949!. Bethlehem distr.: Stony veld near Bethlehem, Oct., *Richardson*, s.n!. Kroonstad distr.: Experimental Farm, Febr., *Pont*, 36!. Fauresmith distr.: Fauresmith, *Henrici*, 2310!.

TRANSVAAL PROVINCE.—Potchefstroom distr.: Potchefstroom, Oct., *Burt Davy*, 5591!. Theron, 6!. Wakkerstroom distr.: Vlakkfontein, *Burt Davy*, 4154!. Ermelo distr.: Nooitgedacht, Dec., *Henrici*, 1364!; *Burt Davy*, 9064!. Bethal distr.: Leslie, *Bell* in *Nat. Herb. Pretoria*, 20550!. Belfast distr.: Dullstroom, banks of Crocodile River, Dec., *Galpin*, 13009!. Pretoria distr.: Wonderboompoort, *Rehmann*, 4493!. Division of Plant Industry Grounds, Oct., *Stent* in *Nat. Herb.*, Pretoria, 20525!. Benoni distr.: Benoni, plentiful near water, *Bradfield*, T. 258!. Johannesburg distr.: Wattles, near a marsh, Oct., *Moss*, 13586!. Johannesburg, Oct., *Rand*, 920!.

The type specimen, *Zeyher* 463, is deposited in the *Kew Herbarium*.

In this species the ovaries are often infected by a species of *Tilletia* which may so alter the character of the inflorescence, that specimens so affected appear at first sight to belong to a different species. Among modern gatherings, *Dieterlen* 753 l.c. represents such an infected and malformed plant.

Trisetum imberbe cornutum Nees l.c. is furthermore such an infected plant, and since the name of this "species" was based on a monstrosity, it is a "*nomen illegitimum*" and for that reason must be rejected. It is pointed out elsewhere in this paper that *Avena antarctica* Thunb. is a *nomen dubium* and for that reason is rejected. The only remaining specific epithet available to designate this species is therefore that of "*turgidula*" derived from *Avena turgidula* Stapf l.c. and the type of this species is naturally also Stapf's plant, viz. *Zeyher* 463!.

12. *H. Dodii* (Stapf) Schweickhardt comb. nov.

Syn.: *Avenastrum Dodii* Stapf, in *Dyer*, Fl. Cap. VII, 475 (1899).

Perennial. Culms erect, slender, about 100 cm. high, glabrous, smooth, 3-4-noded, sheathed all along or nearly so, with 1-2 erect intravaginal branches from the lowest nodes. Leaves 3 or fewer from near the base, and 3-4 higher up, distant; sheaths not very tight; the upper rather loose, markedly striate, glabrous and smooth; ligule oblong, up to 4 mm. long; blades linear; the lower tapering from a long attenuate base to a fine point, 30-50 cm. long and 3-5 mm. wide, flat or with involute margins, fairly rigid, more or less glaucous, glabrous, smooth below, strongly striate and scabrid on the upper surface. Panicle contracted, 20-30 cm. long, narrow, dense or somewhat interrupted, slightly nodding; rachis smooth; branches fascicled, unequal, divided from the base or nearly so; longest up to 5 cm., erect, scaberulous or smooth below. Spikelets about 12 mm. long, narrow, erect, 4-5-flowered. Glumes subequal, lanceolate, shortly aristulate, subhyaline; the lower 6-7 mm. long and 1-nerved; the upper 7-9 mm. long and 3-nerved. Rhachilla-internodes 2 mm. long, bearded upwards with hairs about 3-3½ mm. long. Lemmas distinctly exserted, lanceolate, 13-14 mm. long (including the lobes but excluding the awn), glabrous, light green, rather firm, finely granular on the back; lobes scarious, 7 mm. long, produced into fine long bristles. Callus about ⅔ mm. long, short, bearded with hairs about 1.25 mm. long. Awn inserted 5-6 mm. from the base of the lemma; column 5-7 mm. long; bristle 12-15 mm. long. Palea 5 mm. long, densely but not conspicuously ciliate along the keels. Anthers 2 mm. long. Ovary pubescent in upper half.

The type specimen *Wolley-Dod* 2775 is deposited in the Kew Herbarium.

CAPE PROVINCE.—Without precise locality, *Lehmann* (in Herb. Kunth)!. Cape distr.: Wet slopes near Oatlands Point, *Wolley-Dod*, 2775!. By wet rocks, Hout Bay Fisheries. *Wolley-Dod*, 3170!. Platklip, near Capetown, along contour path, Nov., *Andreae*, 83,! Rondebosch, University grounds, Nov., *Levyngs*, 3672, 3565!.

VI.—*AIRA ANTARCTICA* FORST. AND *AVENA ANTARCTICA* THUNB.

During the investigation regarding the identity of *Avena antarctica* Thunb. it became evident that a specimen of this species first described in Thunb. Prodr. Pl. Cap. 22 (1794) is no longer deposited in Thunberg's Herbarium, i.e. at the present time the type specimen cannot be traced at Uppsala. All other efforts to trace the existence of a Thunberg specimen bearing that name in the Montin Herbarium, Bergius Herbarium (both at Stockholm), the Fielding Herbarium at Oxford and the Banksian Herbarium in the Brit. Museum all of which are known to contain a number of Thunberg plants, proved unsuccessful.

As a result of a request made to the authorities at Uppsala for the loan of the type of *Avena antarctica* Thunb., the following sheets were received at Kew:—

- (1) A sheet consisting of three culms and inflorescences of *Bromus bifidus* Thunb. collected in Japan. This sheet bore the name *Bromus bifidus* in the lower right hand corner and superimposed on this the name *Avena antarctica*. The specimen to which these last two names referred has at some time or other been removed from the sheet (traces of gum? can still be seen on the sheet). This may have been Thunberg's plant from the Cape which now cannot be traced. Apparently Thunberg thus at some time or other tried to identify his Cape plant with the Japanese *Bromus bifidus*, but later superimposed the name *Avena antarctica* to replace the misidentification. This sheet furthermore bears the name *Bromus bifidus* on the lower left hand corner and next to it the name *Aira antarctica* Forst.
- (2) A sheet consisting of an inflorescence of *Aira antarctica* Forst. This specimen agrees in every detail with Forster's co-type preserved in the Kew Herbarium and which is a plant very different from any present day known species of *Helictotrichon* from South Africa.

As a point of interest it should be mentioned that Thunberg visited England during December, 1778-January, 1779. He met Forster who showed him the plants he collected during Cook's voyage round the world. Forster even gave Thunberg a fairly large number of duplicates from his collection. These are now preserved in Thunberg's Herbarium. Thus sheet (2) mentioned above is probably an isotype of *Aira antarctica* Forst.

It may be assumed that Thunberg at some time removed the right hand specimen from sheet (1) and remounted it on sheet (2). This would mean that the name *Avena antarctica* Thunb. was based on a fragment of the isotype of *Aira antarctica* Forst., which is a New Zealand plant. Accordingly this name is not applicable to a South African species. It was cited in Thunb. Prodr. and Fl. Cap. merely as a result of an error. Since Thunberg was acquainted with Forster, Forster's Prodr. and plants, it is highly improbable that he would have applied the epithet "*antarctica*" to a species from the Cape. [Although the epithet was used by Linn. fil. to designate a Cape species, viz. *Scirpus antarcticus*, also mentioned by Thunb. Prodr. Pl. Cap. (1794)]. It is thus possible that the name *Avena antarctica* Thunb. found its way into South African literature by mistake and does not

refer to any species from the Cape but to *Forster's* New Zealand *Aira antarctica*. On the other hand it is quite possible that Thunberg's *Avena antarctica* was definitely a species from the Cape and that both specimen and name had nothing to do with Forster's *Aira antarctica*. If this is assumed, the type of *Avena antarctica* Thunb. has probably been lost since all attempts to trace its existence have failed. The absence of a type specimen is in itself not a very serious matter if the descriptions given by Thunberg [Prodr. Pl. Cap. l.c. or Fl. Cap. 436 (1818)] were adequate to identify a South African species by means of them. But several Cape species of *Helictotrichon* are so closely allied that it is impossible to say with certainty which of these Thunberg may have had before him at the time and to which particular species the name could at the present time be applied.

A study of the literature regarding *Aira antarctica* Forst. and *Avena antarctica* Thunb. has shown that these names have been the cause of some confusion.

For example Sprengel [Syst. Veg. 331 (1825)] under *Danthonia antarctica* cites among others as synonyms "*Aira antarctica* Forst. and *Avena* Thunb." Furthermore, Hooker [Fl. New Zeal. 335 (1864)] quotes *Danthonia antarctica* Spreng. under *Trisetum antarcticum* (Forst.) Trin. and consequently this name also includes the Cape species. Juel [Pl. Thunb. 89 (1918)] cites "*Avena antarctica* (Forst.) Thunb. Prodr. 1794, 22; Fl. Cap. 1818, 436. Siehe unter *Bromus bifidus*" for the Cape species and thus assumes that Thunberg based *Avena antarctica* on Forster's New Zealand species. Although this assumption may be correct, stress must be laid on the fact that Thunberg nowhere indicated that his *Avena antarctica* was actually based on Forster's plant. The combination *Avena antarctica* (Forst.) Thunb. is thus not justified.

Desvaux [in G. Jay, Fl. Chilen. VI. 350 (1853)] suggests that the epithet "*antarcticum*" should be retained for the New Zealand *Trisetum antarcticum* (Forst.) Trin. He creates the name *Trisetum Thunbergii* for the species from the Cape to which Nees applied the name *Trisetum antarcticum* based on *Avena antarctica* Thunb. Desvaux evidently realised that the New Zealand plant had been confused with the species from South Africa. His epithet "*Thunbergii*," however, is superfluous, as older specific epithets are available for the complex of species which Nees had placed under *Trisetum antarcticum* (Thunb.) Nees. Further information is to be found in studying the synonymy of the species enumerated in this paper.

Since two names which probably refer to related but distinct plants bearing the same specific epithet have been confused in the literature cited above and since in the absence of the type specimen the identity of the Cape plant cannot be made out with certainty, it is suggested that the name *Avena antarctica* Thunb. be regarded both as a "*nomen ambiguum*" and a "*nomen dubium*" and consequently should be rejected. The name *Aira antarctica* Forst., however, should be retained for the New Zealand species of which the type and isotype specimens are extant!

VII.—ACKNOWLEDGEMENTS.

For the kind loan of material I beg to tender my thanks to the Directors or Curators of all the South African Herbaria and the following European Herbaria: Kew, British Museum, Berlin-Dahlem, Oxford, Paris, Stockholm and Uppsala. My special thanks are due to Sir Arthur Hill, Director of the Royal Botanic Gardens, Kew, for the facilities offered during the preparation of this paper. To Mr. C. E. Hubbard, F.L.S., I am very much indebted for many kind suggestions and helpful advice.

VIII.—EXPLANATION OF FIGURES.

- I. *H. quinquasetum* (Steud.) Schweickerd
- II. *H. longum* (Stapf) Schweickerd
- III. *H. namaquense* Schweickerd
- IV. *H. barbatum* (Nees) Schweickerd
- V. *H. leoninum* (Steud.) Schweickerd
- VI. *H. Galpinii* Schweickerd
- VII. *H. capense* Schweickerd
- VIII. *H. hirtulum* (Steud.) Schweickerd
- IX. *H. natalense* Schweickerd
- X. *H. longifolium* (Nees) Schweickerd
- XI. *H. turgidulum* (Stapf) Schweickerd
- XII. *H. Dodii* (Stapf) Schweickerd

The above figures show :—

- 1. Lower Glume.
- 2. Upper Glume.
- 3. Lemma.
- 4. Rhachilla-internode, anterior view (and lateral view).



Fig. I.



Fig. II.



Fig. III.



Fig. IV.

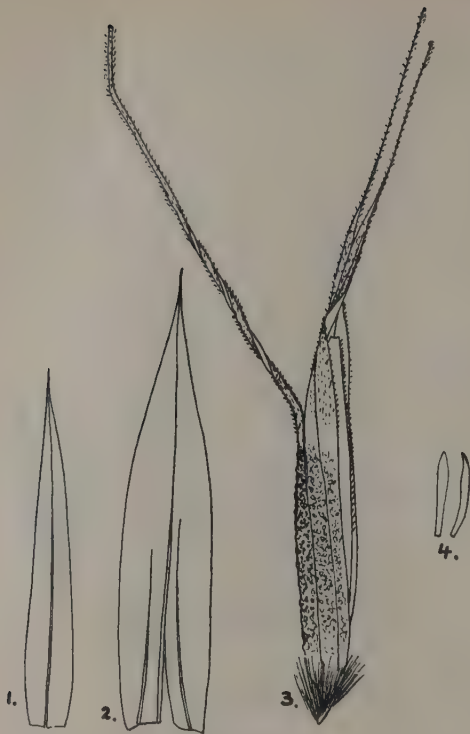


Fig. V.



Fig. VI.



Fig. VII.



Fig. VIII.



Fig. IX.



Fig. X.



Fig. XI.



Fig. XII.

A REVISION OF THE SOUTH AFRICAN SPECIES OF *BRACHYLAENA* R. Brown.

By E. P. PHILLIPS, M.A., D.Sc., and H. G. SCHWEICKERDT, B.Sc., Ph.D., F.L.S.

The first two species from South Africa described by *Linnaeus* and *Lamarck* respectively were placed by these authors under the genus *Baccharis* Linn. In the modern conception, this genus has no representatives in South Africa and is restricted to North and South America. *Thunberg* was more correct, when in his *Prodr. Pl. Cap.*, he described several species under the genus *Tarchonanthus* Linn. Of these some were later referred by the authors to the genus *Brachylaena* R. Br. and have since been found to be conspecific and thus synonymous with the Linnaean and Lamarckian species. The species, however, were satisfactorily grouped when R. Brown on basis of *Baccharis neriifolia* L. created the genus *Brachylaena*, which differs in certain fundamental characters from the genus *Baccharis* L. It would be superfluous to enumerate these differences as they may readily be seen from *Benth.* and *Hook* [Gen. Pl. II. 179 and 180 (1873)], where the former is placed in the *Inuloideae* and the latter in the *Asteroideae*. *Cassini*, in *Bull. Sciences. Philomat.* 1817, p. 151, described the genus *Oligocarpa* on basis of *Baccharis neriifolia* L. His account, however, appeared during September, 1817, whereas R. Brown's description of *Brachylaena* (with which it is congeneric as it was based on the same species) appeared towards the middle of the same year (an exact date is not available). *Brachylaena* R. Br. consequently has priority over *Oligocarpa* Cassin. *Lessing* in his *Syn. Comp.* 208 (1832) correctly referred some of *Thunberg's* species of *Tarchonanthus* to the genus *Brachylaena*, and his conception has since been supported by *De Candolle* and *Harvey* as well as several other authors. *De Candolle's* account in *Prodr.* V. 430 (1836) is fairly comprehensive. Investigation of the specimens cited by that author has shown that in one or two cases the names of the species were misapplied. This is borne out more clearly by the synonymy under the species enumerated in this paper.

The name *Brachychlaena* Post et Kuntze must be regarded merely as an erroneous spelling for *Brachylaena*.

DISTRIBUTION.

The genus is a tropical one and the distribution of the species in South Africa, as with species of other tropical genera, clearly indicates the common path of the migration of such plants. In general the south western area of the Cape Province is invaded by migration along the eastern coastal belt and from Humansdorp westward through the area lying south of the Zwartbergen Range of mountains. In the South African flora it is not uncommon to find representatives of tropical genera as far south as East London or even Bathurst where palms are found native. The two species *B. elliptica* and *B. viciifolia* show a typical distribution in South Africa of species with tropical affinities, i.e. they range from Natal as far as Uitenhage. A similar distribution is shown by *B. discolor* but whose southern limit is Bathurst. When the species mingle with the true Cape flora they can easily be mistaken for an integral part of the original flora unless the distribution of the genus is traced. It may be significant that the two species found in the area of the Cape flora (*B. neriifolia* and *B. glabra*) have quite glabrous leaves whereas the other South African species have leaves which are tomentose beneath. *B. neriifolia* ranges from Clanwilliam, southward

through Ceres and then in the southern districts as far as Humansdorp. It is also found on the summit of the mountain ranges which carry a typical Cape flora and is a characteristic element in the vegetation of the south-western districts of the Cape Province. *B. glabra* has not become a typical "Cape" plant as *B. neriifolia* and though it has been recorded from the Caledon district it still indicates its tropical affinities by having an eastern distribution as far as Natal. One species *B. transvaalensis* is confined to the mountainous region of the north-eastern Transvaal and has probably entered from P.E. Africa as it is also found at Lourenco Marques from where it has migrated southward into Zululand. *B. rotundata* is confined to the Transvaal Highveld and Bushveld while another species *B. huillensis* is only known from a single specimen collected in the Kruger National Park. *B. uniflora* is confined to Natal.

BRACHYLAENA, *R. Br.*, in Trans. Linn. Soc. XII. 115 in not. (1817); *DC.*, Prodr. V. 430 (1836); *Harv.*, Gen. S.A. Pl. 169 (1838); *Harv. et Sond.*, Fl. Cap. III. 115 (1865); *Benth.* and *Hook.*, Gen. Plant. II. 288 (1873); *Engl. and Prantl*, Pflanzenfam. IV. 5. 174 (1890).

Heads many to few-flowered, unisexual. *Receptacle* naked. *Involucral scales* imbricate, dry, shorter than the florets; in fruit longer or shorter than the achenes. *Corolla* tubular, unequally 5-lobed. *Male flowers*: bisexual; anthers tailed at the base, connate, exserted; style filiform, simple or bifid; ovary hispid, abortive; pappus sparingly developed. *Female flowers*: anthers abortive, separate; style bifid; achenes pubescent or subglabrous; pappus of bristles in two rows.

Dioecious shrubs or trees. Leaves alternate, coriaceous, shortly petiolate or subsessile, entire or toothed, glabrate above, often tomentose beneath. Capitula in racemes or panicles. Flowers yellow. Geograph. distribution: Africa and Mascarene Islands.

Syn.: *Oligocarpa* Cass., in *Bull. Soc. Philomatique*, 1817, p. 151; *Journ. de Physique LXXXVII.* 26 (1818). *Brachychlaena* Post et Kunze, *Lexic. gen. Phan.* 77 (1903).

KEY TO SPECIES.

Leaves glabrous beneath, very rarely rusty tomentose:

Leaves usually long-lanceolate, 5-8 times longer than broad..... 1. *neriifolia*.

Leaves usually elliptic or obovate, 2-4 times longer than broad.... 2. *glabra*.

Leaves white or greyish tomentose beneath:

Male heads 1-3-flowered..... 3. *uniflora*.

Male heads 7-50-flowered:

Leaves distinctly mucronate:

Involucre of bracts 3-4-seriate; bracts densely albo-tomentose.. 4. *huillensis*.

Involucre of bracts 5-8-seriate; bracts never white tomentose.. 5. *ilicifolia*.

Leaves not mucronate:

Heads usually less than 1 cm. long; the innermost bracts scarcely as long as the fruits:

Leaves with petioles 1 or more cm. long, generally over 2 cm. broad 6. *transvaalensis*.

Leaves sessile or subsessile, rarely up to 1.5 cm. broad..... 7. *elliptica*.

Heads usually over 1 cm. long; the innermost bracts longer than the fruits and hiding them:

Involucre of female heads 6-7-seriate; style not swollen at the base (a Transvaal and Rhodesian species)..... 8. *rotundata*.

Involucre of female heads 7-10-seriate; style swollen at the base (Cape Province and Natal)..... 9. *discolor*.

1. *B. neriifolia* (L.), *R. Brown*, in Trans. Linn. Soc. XII. 115 in not. (1816); *Steud.*, Nomencl. I. 98 (1821); *Less.*, Syn. Comp. 208 (1832); *DC.*, Prodr. V. 430 (1836); *Drège*, Zwei Pflzgeogr. Docum. 169 (1843); *Krauss*, in Flora. 1844. p. 671; *Dietrich*, Fl. Univ. N. Folge, t. 4 (1849); *Harvey*, Fl. Cap. III. 116 (1865); *Bibl. Bot.* X. No. 52. 18 (1901); *Bolus* and *Wolley-Dod*, in Trans. S. Afr. Phil. Soc. XIV. 3, 277 (1903); *Sim*, Forest Flor. C.G.H. 246 (1907); *Juel*, Plant. Thunb. 381 (1918); *Sim*, Native Timb. S. Afr. 44 (1921).

Syn.: *Baccharis neriifolia* Linn., Sp. Pl., 860 (1753); Willd., Sp. Pl., III, iii, 1914 (1804); Pers., Syn., II, 423 (1807); *Steud.*, Nomencl., I, 98 (1821); *Spreng.*, Syst. Veg., III, 462 (1826).

Tarchonanthus lanceolatus Thunb., Prodr. Pl. Cap., 145 (1794); Willd., Sp. Pl., III, iii, 1793 (1804); Pers., Syn., II, 405 (1807); *Steud.*, Nomencl., II, 826 (1821); Thunb., Fl. Cap. ed. Schult., 638 (1823); *Spreng.*, Syst. Veg., III, 456 (1826).

Oligocarpa neriifolia Cass., Dict. Sc. Nat., XXXVI, 21 (1817).

Conyza neriifolia L'Hér. ex *Steud.*, Nomencl., I, 98 (1821).

Tarchonanthus dentatus Eckl. and Zeyh. ex *DC.*, Prodr., V, 430 (1836), non Thunb.

Branches grooved, glabrous or minutely puberulous. *Leaves* 2–11 cm. long, 0.5–1.8 cm. broad (5–8 times longer than broad), usually lanceolate, more rarely lanceolate-linear or oblanceolate, obtuse, with the midrib prominent or distinct beneath, and with close reticulate veining, attenuated at the base into a short petiole, entire, very rarely one or two toothed, glabrous. *Inflorescence* a terminal or axillary panicle, more rarely a raceme, 3–9 cm. long. *Male heads*: *Involucre* 2–5-seriate; bracts 1–3 mm. long, 1–3 mm. broad, ovate, more rarely ovate-elliptic or broadly elliptic, obtuse, usually with membranous margins. *Heads* 7–14-flowered. *Corolla-tube* 2–3 mm. long, cylindric, glabrous; lobes 1.5–4 mm. long, linear, linear-lanceolate, obtuse or subobtuse, very rarely sparsely glandular without. *Filaments* 1–2 mm. long, linear; anthers 1.75–2.5 mm. long, linear, acute, tailed at the base. *Ovary* 0.75–2 mm. long, pubescent, very rarely glabrous; style 4–7 mm. long, cylindric, sometimes bulbous at the base, 0.5–1 mm. long, linear, oblong, ovate or ovate-lanceolate, obtuse or subacute. *Pappus* 3–4 mm. long. *Female heads*: *Involucre* 4–5-seriate. *Bracts* 2–4 mm. long, 1–3 mm. broad, ovate to lanceolate, obtuse, rarely ciliate, glabrous, sometimes with membranous margins. *Heads* 6–11-flowered. *Corolla-tube* 2.5–3.5 mm. long, cylindric, glabrous, rarely sparsely glandular; lobes 1–2 mm. long, linear, obtuse. *Ovary* 1–1.5 mm. long, oblong in outline, pubescent or glandular; style 4.5–6 mm. long, cylindric; lobes 5–7.5 mm. long, linear, oblong or linear-lanceolate, acute or subobtuse. *Pappus* 3–5 mm. long.

CAPE PROVINCE.—Without locality: *E.* and *Z.* in *Nat. Herb.*, 11934!; *Schonland*, 576!; *Thom*, 950!; *Niven*!; *Wallich*! *Clanwilliam* distr.: Wupperthal, *Drège*; Pakhuis Pass, in very sandy spots under bushes and rocks, very rare, *Leipoldt* in *Govt. Herb.*, 1905!; *Rogers*, 16836!. *Ceres* distr.: Mountains at Mitchell's Pass, Febr., *Schlechter*, 9960!; Laaken Vlei, at foot of Matroosberg, 3,500 ft., *Phillips*, 1926! and in *Herb. Mus. Austro-Afric.*, 11726!; near Ceres, *Thode*, A2250!. *Paarl* distr.: Banks of upper Berg River, south of Roberts' Vlei, shrub 4–10 ft., *Pillans*, 6754!; French Hoek Pass, on banks of River Zonder Einde *Galpin*, 12382!; river banks, Klein Drakenstein Mountains, near farm Saleni, *Galpin*, 11044!; in respectibus Paarlberg, *Drège*!. *Stellenbosch* distr.: Stellenbosch, 2,000–4,000 ft., *Ecklon*, and *Zeyher*!. *Caledon* distr.: Nieuwe Kloof, Houw Hoek Mountains, *Burchell*, 8080!; Steenbras River at Sir Lowry's Pass, *MacOwan*, 184!; near Steenbras River, 900 ft., *Bolus* in *Natal Govt. Herb.*, 2559! and in *Herb. Wood*, 3802! and in *Herb. Norm. Austro-Afric.*, 184!; *Hermanus, de Beer* in *Herb. Transv. Mus.*, 16529!; near *Hermanus, Smuts*, 1204!; *Caledon, Ellbrecht* in *Herb. Transv. Mus.*, 22126!; Hottentots' Holland Mountains, *Zeyher*!. *Worcester* distr.: On mountains above Worcester, *Rehmann*, 2657; Hex River Valley, 2,000 ft., *Tyson*, 757!; near De Doorns, *Bolus* in *Nat. Herb.*, 21079!; Du Toits Kloof, *Marloth*, 635!;

12746!; Waterkloof, 20 miles south of Worcester, *Andrae*, 332!. Tulbagh distr.: Tulbagh Waterfall, 600 ft., Febr., *Schlechter*, 7511!; *Mundl.* Wellington distr.: Baines Kloof, *Smith*, 2686!. Swellendam distr.: Swellendam, 500-2500 ft., *Mundl.* *Kuntze*!; *Smith*, 2733!; between Grootvaders Bosch and Zuurbraak, *Burchell*, 7260!; Zuurbraak, *Thode*, A2332!. George distr.: George, *Patterson*, 1267!; in moist woods, *Prior*!; The Wilderness, Febr., *Moss*, 5613!; Montagu Pass, *Schweickerdt* in *Nat. Herb.*, 21080!. Knysna distr.: Plettenberg Bay, *Pappel*!; *Zeyher*!; near Deepwalls, *Phillips* in *Herb. Forest Dept.*, 5512!; 5497!; Forest Station, *Schonland*, 3583!; Gouna River, *Keet* in *Herb. Forest Dept.*, 2754; Lily Vlei Forest, *Keet*, 712! and in *Nat. Herb.*, 2108, 3322!; Plettenberg Bay, *Rogers*, 26787!. Riversdale distr.: Corente River, *Muir*, 214!; Glen, *Muir* in *Nat. Herb.*, 3719!. Humansdorp distr.: Ratels Bosch, *Zitzikamma*, *Fourcade*, 576!; north side of Kromme River, near Wagenboom Station, *Burchell*, 4850!; Lottering River, *Zitzikamma*, *Galpin*, 9489!, 4130!; Witkliprivier, *Marloth*, 13064!; Storm's River, *Zahn* in *Herb. Forest Dept.*, 4049!, 4095!. Outdshoorn distr.: Cango Valley, *Marloth*, 12130!. Prince Albert distr.: Zwartberg Pass, near Kliphuis Vlei, *Pocock* in *Nat. Herb.*, 21082!.



B. neriifolia (L.) R. Br.

Common in the Knysna district on banks of mountains and forest streams, up to 6 ft. high and 1-2 in. stem diameter; sometimes a tree 15-18-ft. high. Common name "Water Wit Els."

The type specimens deposited in the *Herb. Linn. Soc. Lond.* and the *Hort. Clifford.* in *Herb. Mus. Brit.* consist of sterile material. The leaves and branches of these resemble modern gatherings in every respect; furthermore the characteristic rusty brown indumentum on the young parts, leaves very little doubt as to the identity of the species.

2. B. glabra (L.f.) Druce, in Rep. Bot. Exch. Cl. Brit. Isles, 1916, p. 611 (1917).

Syn.: *Tarchonanthus glaber* Linn., f. Suppl., 360 (1781); Linn., f. Syst. Nat., ed. 13, 1204 (1791); Steud., Nomencl., II, 826 (1821); Thunb., Fl. Cap. ed. Schultes, 638 (1823).

Tarchonanthus dentatus Thunb., Prodr. Pl. Cap., 145 (1794); Willd., Sp. Pl. III, iii, 1793 (1804); Pers., Syn., I, 405 (1807); Steud., Nomencl., II, 826 (1821); Thunb., Fl. Cap. ed. Schultes, 638 (1823).

Brachylaena grandifolia DC. Prodr., V, 430 (1836); Drège, Zwei Pflzgegor. Doc., 135 (1843).

Brachylaena dentata (Thunb.) Less., Syn. Comp., 208 (1832); Harv., Fl. Cap., III, 116 (1865); Sim, Forest Flor. C.G.H., 246 (1907); Wood, Flor. Natal, 169 (1908); Juel, Plant. Thunb., 381 (1918); Sim, Native Timb. S. Afr., 44 (1921); Bews, Flor. Nat. and Zulul., 215 (1921); Henkel, Woody Pl. Nat. and Zulul., 72 (1934).

Branches grooved, minutely tomentose or glabrescent. *Leaves* distinctly petioled, 3-13.5 cm. long, 1.2-4.5 cm. broad, elliptic-lanceolate, obovate, elliptic-oblong, rounded, subacuminate or distinctly acuminate, obtuse, with the mid-rib and lateral veins distinct beneath, narrowed at the base, entire or sinuate-toothed near the apex, glabrous or more rarely rusty tomentose beneath; petiole 1-1.5 cm. long, concave above, convex beneath. *Inflorescence* a terminal or axillary panicle, 2.5-12 cm. long, rarely up to 15 cm. long. Male heads: *Involucre* 3-6-seriate; bracts 1.75-5 mm. long, 2-4 mm. broad, elliptic, ovate-elliptic, ovate, obtuse, sometimes with membranous margins. *Heads* 13-24-flowered. *Corolla-tube* 2-4.5 mm. long, cylindric, sometimes subcampanulate above, glabrous; lobes 1.5-3 mm. long, linear, linear-lanceolate, obtuse or subobtuse. *Filaments* 1-2 mm. long, linear; anthers 2-3 mm. long, linear, acute, tailed at the base. *Ovary* 1.5-2 mm. long, oblong in outline, pubescent, more rarely villous; style 5-7 mm. long, cylindric; lobes 0.5-1 mm. long, linear, linear-lanceolate or ovate-lanceolate, obtuse or subobtuse. *Pappus* 4-4.5 mm. long. Female heads: *Involucre* about 6-seriate. *Bracts* 2-3 mm. long, 1.5-3 mm. broad with membranous edges; the outer ovate, obtuse; the inner linear to lanceolate. *Heads* 4-5-flowered. *Corolla-tube* 4 mm. long, cylindric; lobes 1-2.5 mm. long, linear-lanceolate, subobtuse. *Ovary* 3-25 mm. long, terete, linear in outline, shortly villous; style 6 mm. long, cylindric; lobes 1 mm. long, oblong-linear, obtuse.

CAPE PROVINCE.—Without precise locality: In Cap. b. spei circa Essenbosch rivum, Nov., Thunberg (2 sheets in *Herb. Thunberg, Uppsala*)!. Caledon distr.: Hermanus, Smuts in *Herb. Marloth*, 11905!. Knysna distr.: Stinkhout Bosch, Sim and Newson in *Herb. Forest Dept.*, 2236!. Humansdorp distr.: Clarkson; Thode, A 860!; Storm's River, Zahn in *Herb. Forest Dept.*, 4050; Kwaaibrand Forest, 700 ft., Burton in *Herb. Forest Dept.*, 40!; near the mouth of the Storm's River, 200 ft., Fourcade, 537!; Stinkhout Bosch, about 2,000 ft., Ross in *Herb. Forest Dept.*, 2061!; Sim and Hewson in *Herb. Forest Dept.*, 2236!; Storm's River, Keet, 543! and in *Herb. Forest Dept.*, 3064!. Port Elizabeth distr.: Waterfall at Van Staden's River, MacOwan, 2076!; Van Staden's Mountains, Zeyher, 2785!; Patterson, 879!; Longmore Forest Reserve, Long, 1051!. Alexandra distr.: Zuurbergen, 2,000-3,000 ft., Drège!. Lusikisiki distr.: Egossa Forest, Sim, 2395!. Uitenhage distr.: Eastern slopes Eland's River Mountains, Sim in *Herb. Forest. Dept.*, 2102!.

NATAL PROVINCE.—Without precise locality, *Garrard*, 1512!; edge of wood, Noodsberg, *Wood*, 5274!, 4129! and in *Natal Govt. Herb.*, 4731!.

Ross in *Herb. Forest Dept.*, 2062 may be a water shoot of the species; if so then the leaves are closely tomentose beneath.

Found in some quantity in Kwaaibrand Forest (Humansdorp distr.) which is almost entirely on Table Mountain sandstone. Common name "Malbar."

According to notes on various sheets this species is a tree of "considerable height" (40–50 ft.) the stem of which may reach a diameter of 10–12 inches. It is a good waggon-wood and is common in parts of the coast region, especially in open places along road-margins in high forest (*Keet*).

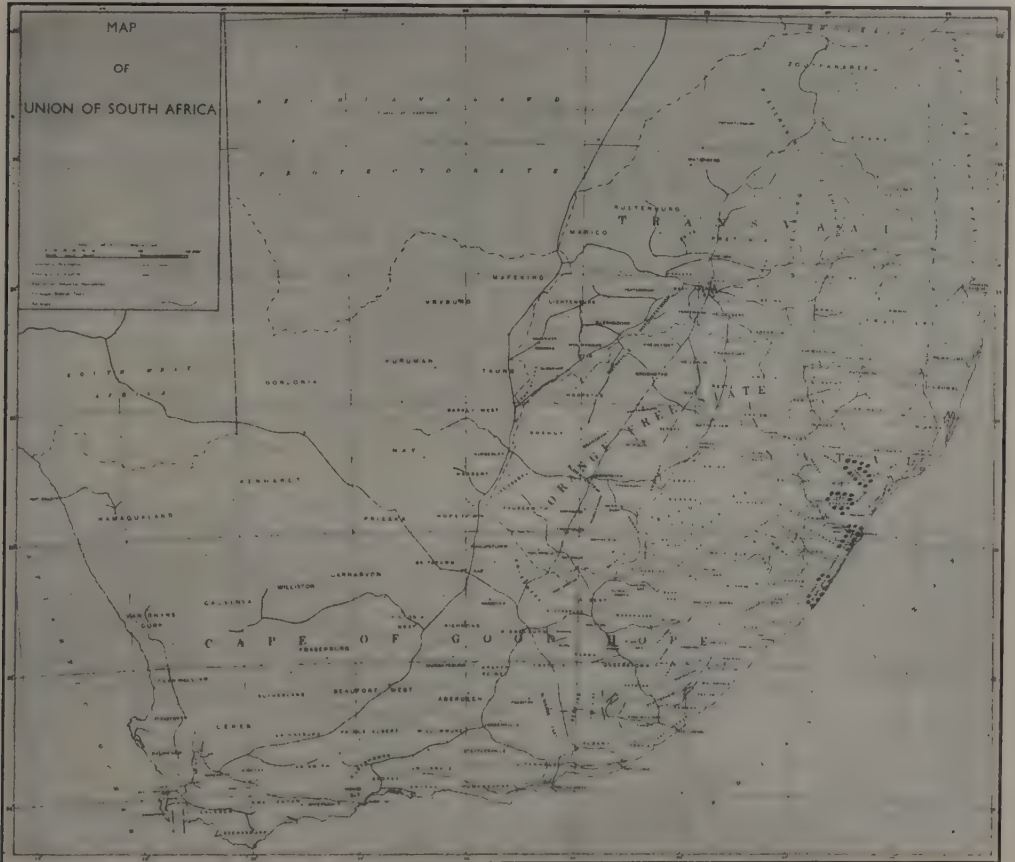


B. glabra (L. fil.) Druce.

3. *B. uniflora* Harv., Fl. Cap., III, 117 (1865); Wood, Flor. Natal, 170 (1908); Bews, Flor. Nat. and Zulul., 215 (1921).

Type specimen deposited in *Herb. Hort. Bot. Reg. Kew*.

Branches slightly grooved, glabrous or the younger parts minutely tomentulose. *Leaves* petioled, 6-12 cm. long, 1.5-4 cm. broad, elliptic-lanceolate, obovate, obovate-oblong to oblong-lanceolate, sometimes subacuminate or acuminate, rounded or obtuse at the apex, narrowed at the base, entire or with crenate-serrated margins in the upper portion, with the mid-rib and lateral veins prominent beneath; petiole 0.5-1.5 cm. long, convex beneath, channelled above. *Inflorescence* a dense panicle, terminal or axillary, 5-8 cm. long; the ultimate heads corymbose. Male heads: *Involucre* 5-6-seriate; bracts 0.5-2 mm. long, ovate to lanceolate or elliptic-lanceolate, obtuse, sometimes with membranous margins. *Heads* 1-3-flowered more or less elongated, about 3 mm. long and 1 mm. in diameter. *Corolla-tube* 2-3.5 mm. long, cylindric, sometimes subcampanulate above; lobes 1-2.5 mm. long, lanceolate, oblong-lanceolate or linear-lanceolate, obtuse or subacute. *Filaments* 1 mm. long, linear; anthers 1-1.75 mm. long, linear, acute, tailed at the base.



B. uniflora Harv.

Style 3·5–6 mm. long, cylindric; lobes 0·5 mm. long, ovate, obtuse or subobtuse. *Pappus* 3·5 mm. long. Female heads: *Involucre* about 6-seriate; bracts 1·25–3 mm. long, about 1 mm. broad, ovate to elliptic, obtuse, with membranous margins. *Heads* 4-flowered, about 3·5 mm. long, and 1·5 mm. in diameter. *Corolla-tube* 2·5 mm. long, cylindric; lobes 0·5 mm. long, lanceolate, subacute. *Ovary* terete, pubescent; style 3 mm. long, cylindric; lobes 0·5 mm. long, ovate, subobtuse. *Pappus* 3 mm. long.

NATAL PROVINCE.—Without precise locality: No collector, in *Natal Herb.*, 778!; *Gerrard*, 291; *Gerrard* and *McKen*, 1866! and in *Natal Govt. Herb.*, 11006!. Port Shepstone distr.: Amanzimtoti, *Kotze*, 432! and in *Herb. Forest Dept.*, 6854!. Pinetown distr.: Durban, *Wood*, 12670!; Sydenham, *Wood*, 12287!; Dumisa, *Rudatis*, 653!, 1052!. Inanda distr.: Inanda, 1,800 ft., *Wood*, 585! and in *Natal Govt. Herb.*, 2826!. New Hanover distr.: On rocky hill, Great Noodsberg, *Wood*, 4129! and in *Natal Herb.*, 4731!. Kranskop distr.: Qudeni Forest, *Davis*, 82! and in *Natal Govt. Herb.*, 8816!.

A common large tree in the Hlatikulu Forest, Zululand.

A species which was only imperfectly known at the time Vol. III of the *Flora Capensis* was being compiled, but additional material collected since has enabled the authors of this paper to draw up the accompanying description of both male and female plants.

According to *Rudatis* this species reaches a height of up to 20 metres.

4. *B. huillensis* O., Hoffm., in Engl. Jahrb., XXXII, 149 (1902).

A tree. *Branches* striate and grooved, glabrous in age; the young parts densely minutely albo-tomentulose. *Leaves* petiolate; petiole 7–10 mm. long, channelled above, convex below, densely albo-tomentulose; lamina up to 7·5 cm. long and 2·0 cm. broad, oblanceolate, conspicuously mucronate, acute, cuneate towards the base, and towards the apex often somewhat undulate, glabrous, shiny and conspicuously veined above, densely albo-tomentulose and inconspicuously veined beneath. *Inflorescence* consisting of pendunculate glomerate capitula, about 15–20 mm. long; capitula at length sub-corymbose. *Male heads*: *Involucre* 3–4-seriate; bracts 1–2·5 mm. long, ovate to ovate-oblong, sub-acuminate or obtuse, densely albo-tomentulose. *Heads* 7–8-flowered, more or less globose, 3 mm. long and 2·5 mm. in diameter. *Corolla-tube* 2·0 mm. long, narrowly funnel-shaped, glabrous; lobes 2 mm. long, oblanceolate, acute or subobtuse. *Filaments* 0·6 mm. long; anthers 1–1·75 mm. long, linear, acute, tailed. *Style* 3·5 mm. long, cylindric; style-branches 0·6 mm. long, subacuminate. *Pappus* setose; bristles 2·5–3 mm. long.

TRANSSVAAL PROVINCE.—Zoutpansberg distr.: Punda Maria, Kruger National Park, *Lang* s.n., in *Herb. Tvl. Mus.*, 32343!.

The above gathering consists of a male specimen only, and thus strictly speaking cannot be compared with the type specimen of *B. huillensis* which is female. Our plant, however, resembles the latter in characters of foliage and habit so closely, that we do not hesitate in referring it to that species. *Leemann* 24 from the Blaauwberg, Pietersburg distr., which is in leaf only is probably this species.

The description given above was drawn up solely from the Transvaal specimen cited. This was done with a view to simplifying any questions regarding synonymy should our plant eventually (after the female has become known from the Transvaal) prove to be a species distinct from the Angolan *B. huillensis* O. Hoffm.

5. *B. ilicifolia* (Lam.) Phillips et Schweickhardt, comb. nov.

Syn.: *Baccharis ilicifolia* Lam., *Encycl. Method. bot.*, i, 345 (1783); Steud., *Nomencl.*, I, 98 (1821).

Tarchonanthus racemosus Thunb., *Prodr. Pl. Cap.*, 145 (1794); Thunb., *Fl. Cap. ed. Schultes*, 638 (1823); Sprengel, *Syst. Veg.*, III, 456 (1826), sub *T. ellipticus* Thunb.

or less globose, about 3.5 mm. long, about 4 mm. in diameter above. *Female heads*: *Involucre* 5-8-seriate; bracts 1.5-5 mm. long, ovate to linear-oblong, obtuse, ciliate. *Heads* 10-flowered, campanulate, 5.6 mm. long, 2.5 mm. in diameter above. *Corolla-tube* 4-5.5 mm. long, cylindric, glabrous; lobes 0.5-3 mm. long, linear or linear-lanceolate, obtuse. *Ovary* 2 mm. long, somewhat angled, pubescent; style 5 mm. long, cylindric; lobes 0.5 mm. long, linear, obtuse.

CAPE PROVINCE.—Without precise locality, de Mr. *Sonnerat* (*Herbier de Lamarck*); in *sylvula Kuka*, Dec., *Thunberg* (2 sheets)!. British Kaffraria: Without precise locality, *Cooper*, 408! and in *Natal Govt. Herb.*, 8336!. Uitenhage distr.: Uitenhage, moist shady places, *Prior*; near Uitenhage, *Burchell*, 4450!; woods by the Zwartkops River, *Ecklon* and *Zeyher*, 481!, 891!; Van Staden's River Mountains, 1,000-3,000 ft., *Wallich*!; at Uitenhage, *Bowie*!. Port Elizabeth distr.: Fish River, *Zeyher*, 819!; Redhouse, *Patterson*, 959!; Zwartkops, *Marloth*, 6110!. Albany distr.: Without precise locality, *Prior*!. Komgha distr.: Among shrubs, near Komgha, 1,800 ft., *Flanagan*, 406!. Fort Beaufort distr.: Kat River, 800-1,000 ft., *Baur*, 1077!. Somerset East distr.: By the Little Fish River, *Burchell*, 3267!; between Zuurburg Range and Klein Brintjies Hoogte, 2,000-3,000 ft., *Drège*!; between Little Fish River and Commandagga, *Burchell*, 3276!. Queenstown distr.: Between Shiloh and Table Mountain, stony and rocky places, 4,000 ft., *Drège*!; Junction Farm, *Galpin*, 8126!.

NATAL PROVINCE.—Without precise locality, *Gerrard*, 1018!. Weenen distr.: *Sutherland*!.

The intensely bitter leaves of this species are said to be a good remedy for diabetes.

Comparison of the types of *Baccharis ilicifolia* Lam., and *Tarchonanthus racemosus* Thunb. has shown these two plants to be conspecific, and consequently Lamarck's epithet has priority.

6. *B. transvaalensis* Phillips and Schweickerdt, sp. nov.: *B. Hutchinsii* Hutch. affinis, sed bractes capituli masculi minoribus et multiseriatis distinguitur.

Arbor. *Rami* striati, minute tomentulosi, vel glabri. *Folia* petiolata, 3.5-16.5 cm. longa, 1.2-3.7 cm. lata, lanceolata, elliptico-lanceolata vel obovato-lanceolata, nonnunquam breviter acuminata, rotundata vel obtusa, perraro acuta, integerrima vel margine dentata et undulata, supra glabra, subtus albo-tomentosa; petiolus 1-1.2 cm. longus, supra canaliculatus, subtus convexus. *Inflorescentia* e paniculis terminalibus vel axillaribus sistens, 4.5-16 cm. longa; capitula deinde subcorymbosa. *Capitulum masculinum*: *Involuerum* 4-6-seriatum; bractea 1-2 mm. longae, ovatae vel ovato-lanceolatae vel lanceolatae, obtusae, plus minusve tomentosae, marginibus membranaceae vel ciliatae. *Capitula* 11-16-flora, plus minusve globosa, 2 mm. longa et 2.5 mm. diametro. *Corollae* tubus 3-3.5 mm. longus, cylindricus, glaber; lobi 2 mm. longi, lanceolati, obtusi vel subacuti. *Filamenta* 0.5-1 mm. longa, linearia; antherae 1.5-2 mm. longae, lineares, acutae, caudatae. *Stylus* 5.5-6 mm. longus, cylindricus; lobi 0.5 mm. longi, ovati, nonnunquam subacuminati, acuti et obtusi. *Capitulum foemineum*: *Involuerum* 6-seriatum; bractea 1.5-4 mm. longae, ovatae vel ovato-ellipticae, obtusae vel subacutae, glabrae vel sparse tomentosae. *Capitula* 8-flora, ambitu plus minusve obovata, circiter 3.5 mm. longa et 3 mm. diametro. *Corollae* tubus 3.5 mm. longus, angulatus; lobi 0.5 mm. longi, ovati, subacuti. *Ovarium* 3.5 mm. longum, pubescens, teres; stylus 5 mm. longus, cylindricus, basin versus incrassatus; lobi 0.75 mm. longi, ovati-lanceolati, subobtus.

TRANSVAAL PROVINCE.—Pietersburg distr.: Forest between Woodbush and Haenertsburg, 4,000-6,000 ft., *Hutchins* (type! deposited in *Herb. Hort. Bot. Reg. Kew*); O'Connor in *Herb. Forest Dept.*, 1471!, 3559!; Woodbush, *Hoffman*, 79!; no collector in *Herb. Transv. Mus.*, 9703!; Tzaneen, Pigeon Hole Farm, *McCallum*, 1532!; Woodbush, *Grenfell* in *Col. Herb.*, 1105!; Botha in *Herb. Forest Dept.*, 3559!, 5286!; no collector, in *Herb. Forest Dept.*,

4974!; Middelkop Plantation, *Keet*, 1189!. Lydenburg distr.: On farm Hebron, *Ketze in Herb. Forest Dept.*, 2835!. Pilgrims Rest distr.: Sabihoek, *Oranje*, 2!; Lothian, *Keet*, 1130!; Graskop, *Evans in Herb. Forest Dept.*, 5398!; Joubert in *Herb. Forest Dept.*, 8724!. Barberton distr.: Wooded ravines, Rimer's Creek, 3,000–4,000 ft., *Galpin*, 451!; *Thorncroft in Herb. Transv. Mus.*, 11174!, 2773!; Stentor, *Munro*, P.S. 35!.

NATAL PROVINCE.—Pinetown distr.: Stella Bush, near Durban, *Tyrrell in Natal Herb.*, 21310!; Amanzimtoti, *Gerstner in Natal Herb.*, 22079!. Zululand: Ngomi Forest, *Tustin in Herb. Forest Dept.*, 3555!, 3556!; N'Kanghla Forest, *Forbes*, 766!; Hlatikulu Forest, *Boocock*, 26! and in *Herb. Forest Dept.*, 5323!.

P.E. AFRICA.—Lourenco Marques, on beach, *Munro*, P.S. 166!; Maputaland, *Maputaland Exped.*, in *Herb. Transv. Mus.*, 14354!.



B. transvaalensis Phill. and Schw.

A specimen (*Hubbard in Herb. Forest Dept.*, 3668 and in *Nat. Herb.*, 21083) collected on Meintjies Kop, Pretoria, is stated by the collector to be probably a cultivated specimen from the northern Transvaal. *Burt Dury*, 1521, Sabie Hoek Forest, Lydenburg distr.;

Burt Davy, 1171, Potato Bush, Zoutpansberg distr.; *Burt Davy*, 1413, near Pilgrim's Rest; *Burt Davy*, 2692, Madjadjes Mountains, Zoutpansberg distr., all without flowers are probably water shoots of this species.

A large tree up to 70 ft. high and a bole up to 3 ft. in diameter but seldom sound when so large. Wood used a great deal by natives for making assegai handles. Found throughout the Ngomi Forest, Zululand, up to 4,000 ft. altitude. In the Transvaal found associated with dense forest at all elevations from 3,000 ft. upwards. Mostly a crooked much-branched tree growing along the edge of the forest but frequently inside when it makes a fine straight bole. Timber strong elastic and durable in the ground. Common name "Vaalbos"; Sesuto name is "M'pata."

[*Obermeyer*, *Schweickerdt* and *Verdoorn* 349 from the southern slopes of the Zoutpansberg is probably a female plant of the above species, but since no female specimens have been seen in the Kew Herbarium, there is some uncertainty with regard to the identity of this sheet.] The specific epithet was given by Dr. J. Hutchinson but no description published.

7. *B. elliptica* (Thunb.) Less., Syn. Comp., 208 (1832); *Harvey*, Fl. Cap., III, 116 (1865); *Sim*, Forest Flor. C.G.H., 246 t. 92 (1907); *Wood*, Pl. Natal, 169 (1908); *Juel*, Plant. Thunb., 381 (1918); *Sim*, Native Timb. S. Afr., 44 (1921); *Bews*, Flor. Nat. and Zulul., 215, (1921); *Henkel*, Woody Pl. Nat. and Zulul., 72 (1934).

Syn.: *Tarchonanthus ellipticus* Thunb., Prodr. Pl. Cap., 145 (1794); Willd., Sp. Pl., III, iii, 1793 (1804); Pers., Syn., II, 405 (1807); Steud., Nomencl., II, 826 (1821); Thunb., Fl. Cap. ed. Schult., 638 (1823); Spreng., Syst. Veg., III, 456 (1826), excl. syn.

Brachylaena dentata DC., Prodr., V, 430 (1836), incl. syn., non Less.; Drège, Zwei Pflzgeogr.—Docum., 169 (1843).

Brachylaena dentata var. *β salicina* DC., Prodr., V, 430 (1836).

Type specimen deposited in *Herb. Thunberg, Uppsala*.

Branches grooved minutely tomentulose. *Leaves* sessile or shortly petioled, 1.5–10 cm. long, 0.5–3 cm. broad, linear, linear-lanceolate, lanceolate, oblanceolate, elliptic-lanceolate or obovate, obtuse, narrowed at the base, entire or the margins somewhat serrate, toothed or irregularly lobed above, glabrous above, white tomentose beneath, with the mid-rib and lateral veins prominent or distinct. *Inflorescence* a dense terminal or axillary panicle or raceme, leafy, mostly compact but sometimes each axillary inflorescence distinct. *Male heads*: *Involucre* 2–5-seriate; bracts 1–3 mm. long, ovate, sometimes with membranous margins, sometimes ciliate or margins shortly lacerate. *Heads* 7–11-flowered, campanulate, about 1.5 mm. long, 1.5 mm. in diameter above. *Filaments* 0.75–1.5 mm. long, rarely 3 mm. long, linear; anthers 1–2.5 mm. long, linear, acute, tailed at the base. *Style* 3–7 mm. long, cylindric, lobes 0.5 mm. long, ovate or lanceolate, usually acuminate, acute or subacute. *Pappus* 1.75–3 mm. long, rarely 4 mm. long, usually rough, sometimes barbellate near the tips. *Female head*: *Involucre* 3–5-seriate; bracts 1–2 mm. long, ovate, obtuse, usually with membranous margins, usually ciliate. *Heads* 4–7-flowered, campanulate, about 2.5–3 mm. long, 2 mm. in diameter above. *Corollatube* 2.35–3 mm. long, cylindric, glabrous; lobes 0.5 mm. long, oblong or linear, subobtus. *Ovary* 2.5 mm. long, glabrous or pubescent. *Achenes* 4 mm. long, obscurely angled, pubescent. *Pappus* 3–3.5 mm. long.

CAPE PROVINCE.—Without locality, *Watt* and *Brandwyk*, 1808! Uitenhage distr.; Without precise locality, *MacOwan*!; between Enon and Zuurberg Range, *Hoffmanns Kloof*, 1,000–2,000 ft. *Drege*!; Zuurberg Pass, 1,800 ft., *Leng*, 707! Bathurst distr.: Kowie West, on bush slopes, *Tyson* in *Herb. Transv. Mus.*, 1725! and in *Herb. Mus. Austro-Afric.*, 13364! and in *Gort. Herb.*, 12625! and in *Herb. Marloth*, 8876!; Bell's Beach, Kowie,

Britten, 2095!; Port Alfred, *Rogers*, 16601!. Albany distr.: Grahamstown, *Schlechter*, 2652! and in *Herb. Transv. Mus.*, 21396!; Broekhuizen's Poort, *South*, 670!, *Cooper*, 1563! and in *Natal Govt. Herb.*, 8293!; *Zeyher*, 2736!; *MacOwen*, 244! and in *Natal Govt. Herb.*, 252!, 11005!; Brakkloof, *White*, 1172!; near Riebeeck East, between Zwartwaterpoort and the Zwartwaterberg, *Burchell*, 3456!; Zwartwaterpoort, *Burchell*, 3375!, 3361!, 3400!; near Grahamstown, *Dyer*, 1340!. Bedford distr.: Kagaberg, *Scott-Elliott in Herb. Galpin*, 101!. Adelaide distr.: Without precise locality, *Marloth*, 5356!; *Watt and Brandwyk*, 1286!; summit Mungo Mountain, *Galpin*, 11544!. Kingwilliamstown distr.: Evelyn Valley, *Perie Mountains, Scott-Elliott*, 995!. Stockenström distr.: Katberg, *Stayner*, 99!. Stutterheim distr.: Fort Cunningham, 3,500 ft., *Sim*, 2107!. East London distr.: East London, *Rattray*, 70!; *Watt and Brandwyk in Nat. Herb.*, 6059!; *Dowling*, 16!; *Munro in Nat. Herb.*, 3333!. Komgha distr.: Near Kei mouth, *Flanagan*, 194!, 241!. Kentani distr.: In woods near Kentani, *Pegler*, 997!, 1521!. Mqanduli distr.: Banks of Umtata River, *Drège*. Port St. John's distr.: Between Umtata River and St. John's River, *Drège*!; Pungwane Forest, *Boshoff in Herb. Forest Dept.*, 3474!; Mtambalala Ridge, *Fegen in Herb. Forest Dept.*, 3340!.



B. elliptica (Thunb.) Less.

NATAL PROVINCE.—Without precise locality, *Cooper*, 1141!. Umzinto distr.: Near Umzumbi, *Wood*, 3052! and in *Natal Govt. Herb.*, 252!; sunny slopes Ifafa Valley, *Rudatis*, 981!; Umkomaas, *Wood*, 4609! and in *Natal Govt. Herb.*, 6411!; Impambantoni Valley, *King*, 97!. Pietermaritzburg distr.: Without precise locality, *Rehmann*, 7595!; Thornybush Junction, *Marriott in Natal Herb.*, 24335!. Pinetown distr.: Near Durban, *Wood*, 10977!. Inanda distr.: Umgeni, *Wood*, 8434! and in *Natal Govt. Herb.*, 9133!; Verulam, *Wood*, 936!. Umvoti distr.: Near Greytown, *Wood in Natal Govt. Herb.*, 8893!. Weenen distr.: Hills above Weenen, *Wood*, 4445! and in *Natal Govt. Herb.*, 5160!. Lion's River distr.: Howick, *Mogg in Nat. Herb.*, 21078!. Ubombo distr.: Zululand, Mfongosi River, *Watt and Brandwyk*, 1014!, 1209!.

A specimen, *Zeyher* 271 labelled as from the Kat River, near Philipstown is evidently incorrect as no species of *Brachylaena* occurs so far inland.

Shrub 8 ft. high or a small tree found in the Karroid-scrub veld of the Albany district; eaten by stock (R. A. Dyer). Bush up to 15 ft. high in Natal. Native name "Isiduliwe-hlati."

According to various authors and collectors this species is a shrub or small tree up to 12 ft. high. In leaf-shape it is one of the most variable species of the genus; the floral characters, however, appear to be fairly constant throughout the wide range of material seen by the authors of this paper.

8. *B. rotundata* S. Moore, in *Journ. Bot.*, 1903, p. 131; *Burt Davy and Pott*, in *Ann. Tvl. Mus.*, III, iii, 168 (1912); *Sim*, *Native Timb. S. Afr.*, 44 (1921).

The type specimen is deposited in *Herb. Mus. Brit.*

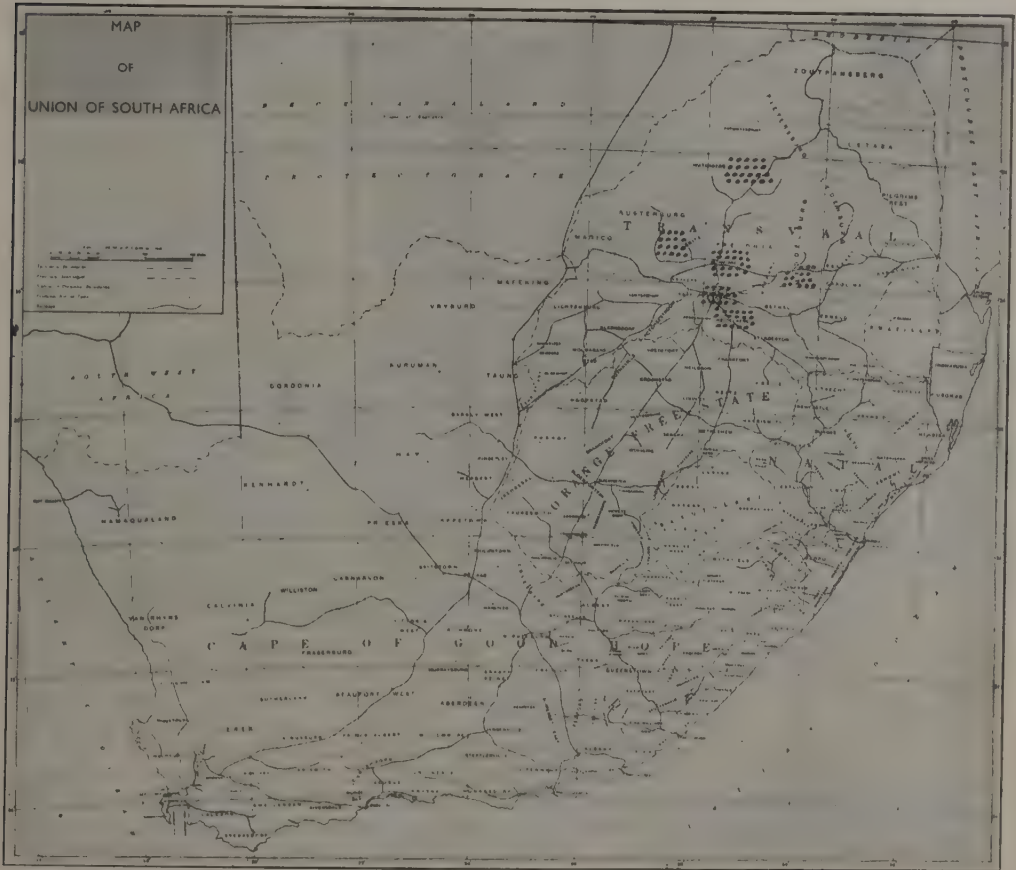
Branches grooved, shortly but densely albo-tomentose, rarely tomentulose. *Leaves* petioled or more rarely sessile, 2.5–10 cm. long, 1.5–2 cm. broad, mostly elliptic, more rarely elliptic-lanceolate, obtuse, usually rounded at the base, more rarely slightly narrowed, with entire or irregularly-toothed margins, with the mid-rib and lateral veins prominent beneath, glabrous above, albo-tomentose beneath; petiole 5 mm. long. *Inflorescence* a dense terminal panicle with the ultimate heads sometimes cymose. *Male heads*: *Involute* 4–10-seriate; bracts 1.5–5.5 mm. long; the outer ovate, obtuse, with membranous margins, sometimes shortly ciliate and glandular on the lower half; the inner ovate to linear, with membranous margins, sometimes acuminate, glabrous or glandular on the lower half. *Heads* 13–31-flowered. *Pappus* 4–5 mm. long. *Corolla-tube* 3–4.5 mm. long, cylindric, glabrous, sometimes sparsely glandular; lobes 0.5–3 mm. long, linear or lanceolate, obtuse or acute, sparsely glandular without. *Filaments* 1–3 mm. long, linear; anthers 1–3 mm. long, linear, sometimes acuminate, acute, tailed at the base. *Female heads*: *Involute* 6–7-seriate; bracts 2–5 mm. long, ovate, ovate-lanceolate, linear-lanceolate to linear, obtuse, usually with membranous margins and often glandular on the lower half. *Pappus* 5–6.5 mm. long. *Corolla-tube* 4–5.5 mm. long, cylindric, sometimes sparsely glandular; lobes 0.5–0.75 mm. long, ovate-lanceolate to lanceolate, obtuse. *Ovary* 2–4 mm. long, linear in outline, pubescent or shortly villous; style 4.5–5.5 mm. long, cylindric; lobes 0.5–1 mm. long, elliptic to lanceolate, obtuse.

TRANSVAAL PROVINCE.—Witwatersrand distr.: Jeppe's Ridge, Johannesburg, *Gillallan in Herb. Galpin*, 6018!, 6019!; near Johannesburg, *Adlam in Natal Govt. Herb.*, 7181! and in *Herb. Wood*, 5633!; Johannesburg, *Conrath*, 359!; *Gillfillan in Herb. Galpin*, 6125!; *Moss*, 2505!, 2554!, 2261!; *Rand*, 738! (type). Pretoria distr.: Pretoria, Meintjes Kop, *Pole Evans*, 474!; Pretoria Koppies, *Leendertz*, 235! and in *Herb. Transv. Mus.*, 8702! and in *Natal Govt. Herb.*, 10507!; *Rogers*, 232!; Aapies Poort, *Rehmann*, 4075!; Wonderboom Poort, *Mogg in Herb. Forest Dept.*, 1669!; Onderstepoort, *Mogg in Govt. Herb.*, 15688!; near Pretoria, *Goossens*, 81!; *Mogg*, 15165!, 15309!, 15222!, 15170!, 15088!; *Smith*, 5!; *Verdoorn*, 456!; *Repton*, 18!; *Munro in Nat. Herb.*, 3331!, 1747!; *Pole Evans*, 150!; Hartebeestpoort,

Keet, 1270!. Magaliesberg, *Leemann in Nat. Herb.*, 21116!. Heidelberg distr.: *Bonsma in Herb. Transv. Mus.*, 13139!. Rustenburg distr.: Rustenburg, *Collins in Herb. Transv. Mus.*, 11966!; *Leendertz in Herb. Transv. Mus.*, 9898!; Buffels Poort, *Turner*, 35!. Potgietersrust distr.: Potgietersrust, Pyramid Estate, *Galpin*, 8818!; near Potgietersrust, *Burt Davy*, 2273!. Middelburg distr.: Near Mission Station, Botsabelo, on Little Olifants River, *Marloth*, 11743!, 11755!.

Also occurs in Rhodesia.

NOTE.—*Burt Davy*, 2273 from near Potgietersrust; *Burt Davy*, 2448 and *Mogg*, 15048 from Pretoria; *Murray*, 672 from Heidelberg probably belong to this species.



B. rotundata Sp. Moore.

9. *B. discolor* DC., Prodr., V, 430 (1836); *Drège*, Zwei Pflzgeogr.-Docum., 155 and 157 (1843); *Harv.*, Fl. Cap., III, 117 (1865); *Wood and Evans*, Natal Pl., I, t. 23 and 24 (1898); *Sim*, Forest Flor. C.G.H., 247 (1907); *Wood*, Flor. Natal, 169 (1908); *Sim*, Forest Flor. Portug. E. Afr., t. 73 (1909); *Sim*, Native Timb. S. Afr., 44 (1921); *Bews*, Flor. Nat. and Zulul., 215 (1921); *Henkel*, Woody Pl. Nat. and Zulul., 72 (1934).

Syn.: *Brachylaena natalensis* Sch. Bip., in Walp. Rep., II, 972 (1843); Krauss, in Flora, 1844, p. 671; Harvey, in Fl. Cap., III, 117 (1865).

Branches grooved, minutely tomentulose or subglabrous. *Leaves* petioled, 2.5–18 cm. long (but usually 6–10 cm. long), 1–7 cm. broad, elliptic-oblong, obovate-lanceolate or oblong-lanceolate, obtuse, narrowed at the base into the petiole, entire or remotely toothed, with the mid-rib and lateral veins prominent beneath, glabrous above, white tomentose beneath; petiole about 1 cm. long, convex beneath, scarcely channelled above. *Inflorescence* an axillary or terminal raceme or panicle, with the ultimate heads sometimes cymose. *Male heads*: *Involucre* 5–9-seriate; bracts 1–4.5 mm. long, ovate, obtuse, ciliate, sometimes woolly; the inner ovate, lanceolate to linear, usually woolly-ciliate. *Heads* 11–50-flowered. *Corolla-tube* 3–5 mm. long, cylindric, sometimes gradually narrowing from the base upwards, glabrous; lobes 2 mm. long, lanceolate to linear, usually obtuse, sometimes subacuminate and subacute. *Filaments* 1–2.5 mm. long, linear; anthers 1.5–2.5 mm. long, linear, acute, tailed at the base. *Style* 4.5–8.5 mm. long, cylindric; lobes 0.5–1 mm. long, ovate to lanceolate, subacute. *Pappus* 4–5 mm. long. *Female heads*: *Involucre* 7–10-seriate. *Bracts* 3–5 mm. long, ovate, obtuse, usually woolly; the inner long and lanceolate to linear. *Heads* 11–26-flowered. *Corolla-tube* 5–7.5 mm. long, cylindric, usually widened at the base and sometimes 5-angled or with 5 veins; lobes 0.5 mm. long, ovate to linear, obtuse, more rarely subacute. *Pappus* 7–8 mm. long. *Ovary* 2.5–4.5 mm. long, linear in outline, grooved or sometimes angled, sparsely pubescent, style 6.5–10 mm. long, cylindric, swollen at the base; lobes 0.5 mm. long, ovate to linear, obtuse. *Young fruits* glabrescent.

CAPE PROVINCE.—Without precise locality, *Ecklon*, 269!. Somerset East distr.: Without precise locality, *Bowker*!. Bathurst distr.: Port Alfred, *Burchell*, 2823!; *Tyson*, 54!; *Marloth*, 11998!; *Schonland*, 3304!; *Tyson* in *Govt. Herb.*, 12571! and in *Herb. Marloth*, 8575!; *Britten*, 773!, 1837!; at the mouth of the Great Fish River, *Burchell*, 3751!. East London distr.: East London, *Gane*, 304!; *Munro* in *Nat. Herb.*, 3332!. Komgha distr.: Among shrubs near Kei Mouth, *Flanagan*, 860!. Ngqeleni distr.: Bush on sand dunes, *Fegen* in *Herb. Forest Dept.*, 2060!. Port St. John's distr.: Port St. John's, *Doran* in *Herb. Forest Dept.*, 1980!. Bizana distr.: Between Umtentu and Umzimkulu River, under 500 ft., *Drège*.

NATAL PROVINCE.—Without precise locality, *Gerrard* and *McKen*, 348!, 1017! and in *Natal Govt. Herb.*, 251!, 802!; *Cooper*, 1240! and in *Natal Govt. Herb.*, 8311!. Port Shepstone distr.: Port Shepstone, Shelly Beach, *Letty*, 222!; *Burt Davy*, 2392!. Pinetown distr.: Salisbury Island, Durban, *Forbes*, 230!; Durban, *Wood*, 5!, 4907!, 12670! and in *Herb. Transv. Mus.*, 15417!; *Krauss*, 243!; in coastal bush, *Schlechter*, 2886!; on dunes, *Rudatis*, 1089!; in dune scrub, *Moss*, 2502!, 1503!; *Marloth*, 4174!; Umbogintwini, *Salter*, 382/7!; Illovo Beach, *Hubbard* in *Herb. Forest Dept.*, 6103!; north end of Berea Ridge, *Galpin*, 12114!; Amanzimtoti, *Kotze*, 450! and in *Herb. Forest Dept.*, 6873!; Isipingo, *Forbes* and *Obermeyer*, 28!; *Hutchinson*, *Forbes* and *McClean*, 6!. Umzinto distr.: Without precise locality, *Rudatis*, 673!. Zululand: Dukuduku Forest, *Kotze* in *Herb. Forest Dept.*, 6533!; *Fair* in *Herb. Forest Dept.*, 8134!; northern Zululand, *Kotze* in *Herb. Forest Dept.*, 3516!. Mtunzini distr.: No locality, *Thode*, A1532!.

P.E. AFRICA.—Lourenco Marques, in coastal bush, *Bolus*, 1173!; *Monteiro*, 36!; *Forbes*!; *Borle*, 6!; Inyack Island, *Breyer* in *Herb. Transv. Mus.*, 20442!.

NOTE.—The record given by Burt Davy and Pott (*Ann. Transv. Mus.*, vol. 3, p. 168) is an error. It is most probably *B. rotundata* Sp. Moore.

Common in coastal bush round Durban. At the Blue Lagoon it is grown as a hedge (Phillips).



B. discolor DC.

ACKNOWLEDGEMENTS.

The authors wish to express their gratitude to the Directors and Curators of the various herbaria for the loan of type specimens. Special thanks are due to Sir Arthur Hill, Director of the Royal Botanic Gardens, Kew, who gave the facilities afforded for this paper to be completed at the Herbarium, Kew.

AN ENUMERATION OF PLANTS COLLECTED IN THE NORTHERN TRANSVAAL.

By A. A. OBERMEYER, M.Sc., H. G. SCHWEICKERDT, Ph.D. and I. C. VERDOORN.

THE following list is a classified account of the names of ferns and flowering plants collected during two excursions to the farm "Zoutpan" at the western extremity of the Zoutpansberg range. Most of the specimens were collected around the salt pan on this farm or in the vicinity of it, such as on the slopes of the mountain on the eastern margin of the pan and the sandy flats stretching to the west of it. Some of the plants listed, however, were collected on the way to and from this area or on short excursions from the pan to neighbouring places.

A paper by H. G. Schweickerdt [*S.A. Journal of Science*, 30, 270 (1933)] gives an account, accompanied by a map, of the vegetation of the area surrounding this salt pan. Reference should be made to it when studying this list. Further a paper by Dr. C. E. B. Bremekamp "New and otherwise Noteworthy Plants from the Northern Transvaal" [*Annals of the Transvaal Museum*, 15, 11 (1933)] covers more or less the same ground but includes specimens collected during a general tour.

Our first excursion was undertaken in November, 1932, when 438 specimens were collected and numbered "Obermeyer, Schweickerdt and Verdoorn 1 to 438." The route taken on this occasion was from Pretoria to Pietersburg and thence via Kalkbank and Vivo to the farm Zoutpan. Camp was pitched just behind the homestead under *Lonchocarpus* trees and overlooking the salt pan. During 10 days spent there two short trips were made, one westward towards the Blaauwberg to the farm Eyem and the other via Booysen's farm Chapudi to Waterpoort. Otherwise the time was spent surveying the area around the pan. The route taken on the return journey was via Wylie's Poort and Louis Trichardt.

The second excursion made in April, 1934, was undertaken by Miss Verdoorn and Dr. Schweickerdt (Miss Obermeyer being in Europe at the time). While camping at the homestead for five days, further collections were made in the same area and one short trip was made to Duvenhage's Pan near Amisfort to collect water plants. On this second excursion 252 specimens were collected and numbered "Schweickerdt and Verdoorn 440 to 691." Consecutive numbers were used for the plants collected on the two excursions to avoid confusion. The route via Louis Trichardt and Wylie's Poort was taken both going and returning.

The farm Zoutpan appears to be the meeting place of at least four distinct types of vegetation, the Eastern Mountain Flora reaching to the very margin of the pan on the east, the Kalahari-desert Flora from the west, the Bushveld from the south and the sub-tropical plants from the north. For this reason a botanical survey of the area seemed to hold out prospects of interesting discoveries. We consider this assumption has been justified and hope that the following list and notes of our identified plants may help future workers in the study of plant geography in Southern Africa.

The specimens were first examined at the National Herbarium and Transvaal Museum, Pretoria, by the three authors and later were sent to Kew where Dr. H. G. Schweickerdt had been temporarily transferred. There he verified or corrected the identifications and his notes on some of the specimens in this list are initialed since they were the result of research done in the absence of the collaborators.

FILICES.

1. **Marsilia ephippiocarpa** Alston.
Along margin of Duvenhage's Pan near Amisfort, 628.
2. **Dryopteris thelypteris** (L.) A. Gray.
In vlei at foot of mountain behind homestead, 218.
- D. **Pentheri** (Krass.) C. Christensen; [*D. elongata* (Sw.) Sim non O. Kuntze.]
Along margin of stream in kloof near homestead, 240.

MONOCOTYLEDONS.

8. APONOGETONACEAE.

1. **Aponogeton Rehmannii** Oliver.
In semi-permanent pan on farm "Eyem," north of the Blaauwberg, 84.
- A. **gracilis** Schinz.
In rock-pools on first plateau of northern slopes of the mountain, 317 a. [This species was collected only once before in the Transvaal, viz. in the eastern mountain area (Houtbosch).]
- A. **Holubii** Oliv. forma.
Near Amisfort in Duvenhage's Pan; flowers deep yellow, 625. [This form is closely allied to, if not actually *A. Holubii* Oliv., in which the leaves are more acute and the inflorescences more robust, however, the leaves are markedly cordate in both. *A. Dinteri* Engl. and Krause, another close ally, the type of which I have seen, has narrower and more acute leaves, which are less cordate and the inflorescence is laxer than in our plant (H.G.S.).]

11. HYDROCHARITACEAE.

1. **Lagarosiphon muscoides** forma **longifolia** Wager.
Near Amisfort in Duvenhage's Pan, 627.
2. **Ottelia ulvifolia** (Planch.) Walp. [*O. australis* Bremek., in Ann. Tvl. Mus., XV, ii 235 (1933).]
Near Amisfort in Duvenhage's Pan, 623.

12. GRAMINEAE.

1. **Hyparrhenia Ruprechtii** (Hack.) Fourn.
At foot of northern slopes of mountain, 590.
2. **Cymbopogon excavatus** (Hochst.) Stapf
In camp near vlei at foot of mountain, 224.
- C. **validus** Stapf ex Burt Davy
In drier parts of vlei behind homestead, 587.
3. **Bothriochloa pertusa** (Willd.) A. Camus.
In shade of *Acacia* near margin of pan, 497.
4. **Tragus Berteronianus** Schult.
Along margin of pan, 452, 485. This species apparently is a facultative halophyte.
5. **Paspalum scrobiculatum** L. var. **Commersonii** Stapf
In marshy soil near foot of mountain, 223.

6. *Panicum maximum* Jacq.

In kloof above waterfall, 598 : in shade of trees near foot of mountain, 570 : near margin of pan in shade of *Acacia*, 471. [No. 471 has shortly pubescent spikelets which are smaller in size than those of plants from Rhodesia and Tanganyika. This may be due to the young state of our material. The east African plants placed under this species in Herb. Kew are on the whole more strongly pubescent and more robust in habit. Stapf, in Fl. Trop. Afr., IX, iv, 657, considers hairiness a variable character and thus includes plants such as the above under one species (H.G.S.).]

7. *Urochloa rhodesiensis* Stent

Growing luxuriantly in shade of *Acacia* and attaining a height of 120 cm., 483.

U. panicoides Beauv.

In shade of *Acacia* along margin of pan, 464. A rather small but very leafy plant.

8. *Brachiaria deflexa* (Schum.) C. E. Hubbard ex Robyns; (*B. regularis* Stapf).

In moist places above waterfall in kloof behind homestead, 599.

B. grossa Stapf

On rocky slopes of the mountain, 525. [The spikelets are somewhat smaller and less turgid than those of typical sheets of this species (Angola). The inflorescence is less branched and on the whole our specimen is much weaker than any of the material under this species in Herb. Kew. This constitutes the first record of the species for the Transvaal (H.G.S.).]

B. nigropedata (Munro ex Hiern) Stapf

On mountain slopes behind homestead, 617.

9. *Echinochloa colona* Link

Near rocky pool on northern slopes of mountain, 618.

E. stagnina (Retz.) Beauv.

On grassy slopes near vleĩ behind homestead, 242.

10. *Digitaria debilis* (Desf.) Willd.

Very occasional in marshy ground, 219.

D. eriantha Steud.

On rocky ledges above kloof behind homestead, 607 : on lower northern slopes of mountain, 527.

D. milanjiana Stapf.

Fairly frequent in very sandy area about 3 miles west of pan, 635.

11. *Rhynchelytrum villosum* Chiov.

On lower rocky slopes of mountain, 524 : in sandy area about 3 miles west of pan, 633.

12. *Tricholaena monachne* (Trin.) Stapf et Hubbard

At foot of mountain 589.

13. *Cymbosetaria sagittifolia* (A. Rich.) Schweickerdt

Fairly frequent but scattered in partial shade of *Lonchocarpus* belt, 578. [This constitutes the first record for the Transvaal. So far it has been recorded from Tropical Africa only, including northern South West Africa.]

14. *Setaria verticillata* (L.) Beauv.

Along margin of pan, growing in association with *Heliotropium*, 466. Our gathering is somewhat stunted, undoubtedly due to abnormal edaphic conditions.

15. **Cenchrus ciliaris** L.

Frequent but scattered in *Catophrates* belt, apparently grazed by stock, 179: about 3 miles west of pan in very sandy soil, fairly frequent, 632.

16. **Aristida adscensionis** L.

In shade of *Acacia* near margin of pan, 472.

A. meridionalis Henr.

Very occasional between loose boulders on northern slopes of mountain, 604.

A. junciformis T. and R.

On grassy slopes east of pan, at foot of mountain, 572.

A. barbicollis T. and R.

On margin of pan, only one specimen found, 461.

A. uniplumis Licht.

Dominant in very sandy soil about 3 miles west of pan, 630.

17. **Sporobolus panicoides** Rich.

In shade of bushes at Wylie's Poort, 672.

S. pyramidalis Beauv.

In upper drier regions of vlei behind homestead, fairly frequent, 585: in *Lonchocarpus* belt, 500.

S. Smutsii Stent

A fairly frequent markedly stoloniferous species near the margin of pan, 460: in shade of bushes near margin of pan, 469.

18. **Danthoniopsis Dinteri** (Pilger) C. E. Hubbard (*Trichopteryx Dinteri* Pilger).

Fairly frequent on lower rocky slopes of mountain, 522. The tropical African specimens of this species in Herb. Kew are generally much more robust than our gathering.

19. **Loudetia filifolia** Schweickerdt

On lower rocky slopes of the mountain, subdominant, 523.

20. **Cynodon dactylon** (L.) Pers.

In shade of species of *Acacia* at foot of mountain, leaves distichous, 588: frequent near vlei below mountain, 228.

21. **Chloris virgata** Sw.

In shade of species of *Acacia* near margin of pan, 484.

22. **Dactyloctenium aegyptium** (L.) Beauv.

Occasional near margin of pan, 457: in shade of species of *Acacia* near margin of pan, 490. [No. 490 differs from typical *D. aegyptium* in being a taller plant and an annual, but a large range of flowering and fruiting material will be necessary before it will be possible to say whether more than one species of this genus occurs in South Africa (H.G.S.).]

23. **Enneapogon cenchroides** (Licht.) Hubbard

Fairly frequent on rocky ledges above kloof behind homestead, 608: in shade of species of *Acacia* near margin of pan, 489, 538, 478.

E. Pretoriensis Stent

Fairly frequent on northern rocky slopes of the mountain, 605.

24. **Schmidtia bulbosa** Stapf forma ?

Among loose stones on northern slopes, 569, 606: in very sandy area about 3 miles west of pan, 631. [Our plants differ somewhat from typical *S. bulbosa*. No. 631 differs

particularly in the relatively short awns which only just exceed the membranous lobes of the lemma and the palea being broader and more obovate. The glumes in all three specimens are 9-10-nerved whereas in true *S. bulbosa* they are 7-nerved (H.G.S.).]

This grass is locally known by the vernacular name "krulgras" on account of the very curly appearance of the old withered leaves.

25. *Phragmites communis* Trin.

In marshy soil east of pan along margin of periodic stream, 621.

26. *Trichoneura Schlechteri* Ekman (*Triodia Schlechteri* Pilger, nomen !).

On rocky ledge above kloof behind homestead, 609 : among loose stones on northern slopes of mountain, 526.

These specimens are very similar to *Moisier* 135 from northern Nigeria in Herb. Kew, only differing in being somewhat less hairy. Furthermore they differ from typical *T. Schlechteri* by being annual and having narrower leaf-blades (H.G.S.).]

27. *Odyssea paucinervis* (Nees) Stapf

Along margin of pan, 453, 463, 498, 499. This species is dominant along the margin of the pan. It is a typical halophyte and forms a dense sward surrounding the greater part of the pan. The spikelets are very variable with regard to the number of florets. No. 499 has up to 20-flowered spikelets. The leaves are rigid and pungent.

28. *Eragrostis cilianensis* Link

In shade of species of *Acacia*, east of pan, 540.

***E. aspera* (Jacq.) Nees**

In Wylie's Poort in shade at foot of rocky ledges, 449.

***E. curvula* Nees**

In very deep sandy soil about 3 miles west of pan, 629.

***E. chloromelas* Steud.**

In drier parts of vlei west of homestead, 586.

***E. gummiflua* Nees**

On grassy slopes at foot of mountain, east of pan, 573, 574.

13. CYPERACEAE.

1. *Cyperus sexangularis* Nees

Eastern margin of pan under small *Acacia*, 287.

2. *Pycreus lanceus* (Thunb.) Turrrill

Frequent in vlei behind homestead, 196.

***P. polystachyus* Beauv.**

Occasional in vlei behind homestead, 211.

3. *Mariscus dregeanus* Kunth

Along margin of stream leading from vlei behind homestead, 241.

4. *Kyllinga melanosperma* Nees

Frequent in vlei behind homestead, 212, 197. No. 212 appears to be a somewhat dwarfed specimen, but otherwise agrees in essential characters with this species.

5. *Fuirena chlorocarpa* Ridley

Occasional in vlei behind homestead, 210.

6. **Scirpus muricinux** C.B. Cl.

Frequent in semi-permanent pan on farm "Eyem," north of the Blaauwberg, growing in association with *Marsilia ephippiocarpa* and *Aponogeton Rehmannii*, 82.

7. **Fimbristylis complanata** Link

Frequent in vlei behind homestead, 199.

F. diphylla Vahl.

In vlei behind homestead, 221.

20. XYRIDACEAE.

1. **Xyris capensis** Thunb.

Occasional in vlei behind homestead, 198.

22. COMMELINACEAE.

1. **Commelina Forskalaei** Vahl.

East of pan under cover of *Acacia*; flowers blue, 533. The capsules of this specimen are constantly 1-seeded.

24. JUNCACEAE.

1. **Juncus lomatophyllus** Spreng.

Very frequent in vlei behind homestead, 208.

25. LILIACEAE.

1. **Anthericum elongatum** Willd. var. **holostachyun** Bak.

On southern slopes of mountain about 6 miles west of Louis Trichardt, 343.

2. **Aloe rubro-lutea** Schinz

Between Waterpoort and Zoutpan, 451a: farm "Stafford," north of Blaauwberg, very frequent in open grassland, 647.

Typical plants from S.W. Africa have more densely bracteate inflorescences and appear to flower in December. Our specimens do not differ sufficiently to warrant the creation of a separate species.

3. **Albuca** sp.

Occasional on stony east fringe of the pan, 139. This is probably an undescribed species.

4. **Urginea Langii** Bremekamp

Farm "Kromhoek," north of Blaauwberg; flowers white with greenish keel, gregarious, 80.

This species is fairly frequent in sandy areas in the vicinity of the Zoutpan. Whether it is correctly placed in the genus *Urginea* is somewhat doubtful. In appearance it resembles an *Albuca* more closely and is apparently allied to *Albuca hereroensis* Bak. (Schinz 2 in Herb. Kew!). It differs from this in the shorter pedicels and smaller flowers. Fruiting material, however, is necessary to decide its true affinity. (The species has recently been collected at Rust-der-Winter, Pretoria district, by Dr. I. B. Pole Evans.)

5. **Dipcadi glaucum** (Burch.) Baker

Occasionally gregarious near margin of pan, 29, 259.

D. sp.

Between Zoutpan and Waterpoort, numerous plants in patches; flowers greenish, 268. This is probably an undescribed species.

6. *Scilla megaphylla* Baker

Frequent in shade above rocky ledges near waterfall on farm "Elsteg," about 6 miles west of Louis Trichardt, 367.

7. *Asparagus exuvialis* Burch.

In open patches of *Acacia* belt, on north side of pan, 51: farm "Eyem," north of Blaauwberg, 97.

A. sp.

Creeping in species of *Acacia* on fringe of pan; stems pubescent; fruits small, green, globose, 141.

27. **AMARYLLIDACEAE.**

8. *Crinum buphanoides* Baker

Farm "Eyem," north of Blaauwberg, 86. This is a gregarious species commonly met with in deep sandy soil. The perianth varies in colour from whitish to dark pink; the tube is 10 cm. long, very narrow and greenish in colour while the segments are only about 5 cm. long and spread abruptly.

28. **VELLOZIACEAE.**

1. *Vellozia equisetoides* Baker.

On northern slopes of mountain, 318. This plant has branched stems reaching a height of 1 metre. It was the first record of the species for the Transvaal Province but has since been collected in Sekukuniland.

29. **DIOSCOREACEAE.**

1. *Dioscorea cotinifolia* Kunth (*D. malifolia* Bak.).

Liane in bush above waterfall on farm "Elsteg," about 6 miles west of Louis Trichardt, 360.

DICOTYLEDONS.

36. **SALICACEAE.**

1. *Salix Wilmsii* Seem.

A tree, about 8 metres high, with slender branches; very frequent along stream in Wylie's Poort, 442.

38. **ULMACEAE.**

1. *Trema guineensis* (Schum.) Ficalho

On slopes of mountain of farm "Elsteg," about 6 miles west of Louis Trichardt, 350.

39. **MORACEAE.**

1. *Ficus capensis* Thunb.

In kloof behind homestead; fruit borne on branches at foot of tree, 598a.

F. Pretoriae Burt Davy

On rocky ledge at top end of kloof behind homestead, 614, 281; near foot of mountain; small shrubby tree, 104.

F. Smutsii Verdoorn

On lower rocky slopes of mountain, 600.

F. soldanella Miq.

Northern rocky slopes behind homestead, 280 : at foot of mountain, east of pan, 571. The fruits of 571 are about 1.5 cm. in diam. and thus larger than usual.

F. Sonderi Miq.

On northern rocky slopes of pan, 230 : east of pan, 560 : on rocky slopes along roadside in Wylie's Poort, 669.

No. 230 was a very tall umbrageous tree with a canopy about 30 metres in diameter and with conspicuously whitish to light brown stem and branches. The branches arch downward and touch the ground, but were not found to root as in *F. Pretoriae*.

F. sycomorus L.

At foot of mountain ; fruit with felty pubescence, 593.

F. sycomorus L. *forma* ?

Along stream leading from kloof to homestead, 110. This specimen resembles *F. sycomorus* closely but differs in having larger and almost glabrous fruits. It may represent an undescribed species and requires further study in the field.

40. URTICACEAE.**1. Pouzolzia hypoleuca** Wedd.

Frequent along streams in Wylie's Poort, 337.

42. LORANTHACEAE.**1. Loranthus Breyeri** Bremekamp

North side of pan ; parasitic on *Acacia* sp., flowers yellowish, 52. This species is evidently of limited geographic range.

L. Dregei E. and Z. var.

Parasitic on species of *Acacia*, north of pan ; flowers yellow and green, 47 : on species of *Ptaeroxylon* behind homestead, 17.

L. kalachariensis Schinz

At foot of mountain behind homestead, 517. The clusters of bright red flowers are very striking.

L. oleaefolius var. **Leendertziae** Sprague

Parasitic on malvaceous shrub on northern slopes of mountain ; flowers brownish-red with the reflexed petals green within, 282.

2. Viscum combreticola Engl.

Parasitic on *Pseudolachnostylis* sp., on northern slopes of mountain, 311 : on *Combretum* sp. on northern slopes of mountain, 166.

V. verrucosum Harv.

Parasitic on *Acacia* sp., near margin of pan ; fruit stippled, 492.

45. OLACACEAE.**1. Olax dissitiflora** Oliv.

Very frequent on northern slopes of mountain, 153, 236.

2. Ximenia americana var. **microphylla** Welw. ex Oliver (*X. Rogersii* Burt Davy).

Very frequent at foot of mountain behind homestead, 530, 111.

X. caffra Sond.

Near margin of pan, 295 : at foot of mountain in association with *Dichrostachys* sp., 5.

50. POLYGONACEAE.**1. Polygonum lapathifolium** var. **glabrum** Burt Davy

Hydrophyte, in association with *Nymphaea*, *Ottelia*, etc. in Duvenhage's pan near Amisfort, 626.

Burt Davy in Flora of Transvaal, I, p. 169, states that this variety has glabrous peduncles. The specimen collected by Holub, however, cited under this variety, shows the presence of scattered glands on the peduncles.

P. serrulatum Lag.

In vlei behind homestead ; flowers whitish to heather pink ; bracts pink, 215.

51. CHENOPODIACEAE.**1. Chenopodium ambrosioides** L.

Margin of pan, occasional, 456.

2. Suaeda fruticosa Forsk.

Along margin of pan, 38, 462. This characteristic halophyte together with *Odyssea paucinervis* is one of the dominant species surrounding the pan.

52. AMARANTACEAE.**1. Celosia scabra** (Schinz) (*Hermbsstaedtia scabra* Schinz).

In shade of *Acacia* near margin of pan ; flowers pink, 481. [This species formerly placed under *Hermbsstaedtia* by Schinz has now been transferred to *Celosia* on the grounds that the anthers are inserted on the lobes between the sinuses of the staminal-tube (see Engl. Pflanzenfam., ed. II, 16c (1934). Schinz has furthermore placed *H. linearis* under this genus and following him *H. Rogersii* Burt Davy should also be transferred to *Celosia* (H.G.S.).]

2. Cyathula crispa Schinz

In *Acacia* belt north of pan, 46 : occasional near *Catophractes* belt, 505.

C. uncinulata (Schr.) Schinz (*C. globulifera* Moq.).

Along margin of pan, 496.

3. Pupalia lappacea (L.) Juss.

Near stream in vlei behind homestead, 238.

4. Alternanthera repens (L.) O. Ktze.

In open ground east of pan, 548.

A. sessilis (L.) R. Br.

In stream leading from vlei behind homestead, 207.

53. NYCTAGINACEAE.**1. Commicarpus plumbagineus** (Cav.) Standley. (*Boerhaavia plumbaginea* Cav.).

Growing under cover of shrubs near margin of pan ; herb 3 ft. high ; flowers white to pale mauve ; stamens 2, pink, long, exserted, 19, 451.

C. fallacissimus (Heim.) Heim. forma **pilosa** Heim. differt a typico *C. fallacissimo*: indumento subdenso, pilis scabridulis, brevissimis patulis formato, verticillis summoferis 6-floris, florum (pulchre purpureorum) pedicellis valde brevibus, usque solum 2.5 mm. long., haud capillaribus.

Frequent in sandy soil, growing in association with *Tribulus Zeyheri* Sond., near Vivo; flowers pink; stamens long exserted; fruits glandular, 653 (type): on northern slopes of mountain behind homestead, 103.

The description of this new form was sent by Dr. Anton Heimerl of Vienna. In the letter he states:—

“In den Abhandl. Bot. Ver. Prov. Brandenb. XXXI, 223 (1890) habe ich die der *Boerhaavia verticillata* Poir nahestehende *B. fallacissima* (eine ebenfalls bistaminate Art) beschrieben, die jetzt in die durch Standley abtrennte Gattung *Commicarpus* Standley (Contrib. U.S. Nat. Herb.) XII, 373 (1908) einzureihen ist. Von diesem *Commicarpus fallacissimus* Heim., den ich aus Arabien (Aden) vom Somali-gebiete und aus dem Hererolande kenne, unterscheidet sich die (im schönsten Blüten aufgesammelte) Nr. 653 durch das rauhe, ziemlich dichte, ganz kurze Haarkleid, durch die höchstens 6-blütige Quirle und durch sehr kurze, bis 2.5 mm. lange, nicht haardünne Blütenstiele. Der Arttypus ist fast kahl, die Quirle sind bis 8-blütig und die ganz dünnen Blütenstiele erreichen schon zur Anthese 5–17 mm. an Länge; vielleicht würden reife Anthocarpn (sie fehlen Nr. 653) auch Unterschiede bieten. Ich möchte daher die Transvaal-pflanze als eine bemerkenswerte Form abtrennen und sie als f. *pilosa* anführen.”

2. *Boerhaavia diffusa* L.

In open veld east of pan, forming tussocks; flowers small, purplish-pink, 551. With regard to this gathering Heimerl remarks as follows:—

“Wenn ich die *Boerhaavia* einfach als *B. diffusa* L. bezeichne, glaube ich, keinen argen Verstoß zu begehen; in den Formenkreis dieser weitverbreiteten und sehr formenreichen Art gehört sie sicher, ebenso wie die von mir vor, langer Zeit aufgestellte *B. Schinzii*, die freilich durch einige Merkmale aus der Formenmenge vorragt; das Fehlen von Anthocarpn macht die Sache natürlich auch schwieriger!”

54. PHYTOLACCACEAE.

1. *Limeum Meyeri* Fenzl.

Frequent in very sandy area about 3 miles west of pan; flowers white, 639.

L. *Dinteri* Schell.

Between Waterpoort and Zoutpan, 264.

[In foliage and habit this gathering is a good match of *Dinter* 998 and *Lüderitz* 161 in Herb. Hort. Bot. Berol. The inflorescence in our specimen, however, is more compact and abbreviated, but this difference alone does not warrant its exclusion from the above species (H.G.S.).]

2. *Semonvillea fenestrata* Fenzl.

Very sandy area about 3 miles west of pan, 636.

3. *Gisekia pharnaceoides* L.

Very frequent in sandy area near Vivo; petals purple-pink, 654: east of pan; petals pink-tipped; stamens white, 545.

55. AIZOACEAE.

1. *Mollugo nudicaulis* Lam.

In shade of trees south-east of pan, 584.

M. Cerviana (L.) Ser.

Frequent in open spaces among *Acacia* trees near margin of pan, 532.

2. Pharnaceum salsoloides Burch. (*P. verrucosum* E. and Z.).

In sandy soil on eastern margin of pan; flowers white, 298: in shade of *Acacia* trees east of pan, 534.

3. Orygia decumbens Forsk.

In open sandy soil between Zoutpan and Waterpoort, not very frequent, 269.

4. Trianthema pentandra L.

Very frequent along eastern margin of pan, 546.

T. erectum Schlechter

Along margin of pan; flowers very small in sessile clusters; perianth-segments 5, white; stamens 5 with pink anthers, 459.

[In Herb. Hort. Bot. Berol. four sheets of *Schlechter* 11790 (from Komatipoort, Tvl.) are not unlike our plant. The specimens, however, were collected in a young and sterile stage. In foliage and branching they agree with our plant, but appear to be of an upright habit—in fact they closely resemble the right-hand specimen of our 459 in *Nat. Herb. Pretoria*—whereas the remaining specimen on this sheet has a semi-prostrate habit (H.G.S.).]

5. Sesuvium digynum Welw. ex Oliver (*Trianthema salarium* Bremekamp).

Western side of pan, *Bremek.* and *Schweickerdt*, 232; under *Acacia* shrubs near margin of pan; flowers sessile purple-pink; stamens 9; styles 2, 488.

56. PORTULACACEAE.**1. Talinum Arnotii** Hook. f.

Common in sandy soil between Zoutpan and Waterpoort, 260.

T. caffrum (Thunb.) E. and Z.

Fairly frequent in sandy soil on farm "Eyem," north of Blaauwberg, 93.

T. transvaalensis von Poellnitz

In cover of shrubs in *Catophractes* belt, 193.

2. Portulacaria afra Jacq.

In Wylie's Poort, decumbent on rocks or arborescent, up to 5 metres high, 332.

P. oleracea L.

Occasional along margin of pan; flowers yellow, 31.

P. quadrifida L.

Fairly frequent on eastern side of pan, 294.

P. trianthemoides Bremekamp

Frequent along margin of pan; flowers deep yellow, 458.

59. NYMPHAEACEAE.**1. Nymphaea caerulea** Sav.

In Nyl River about seven miles north of Nylstroom; flowers white with yellow centre, 440.

N. capensis Thunb.

Near Amisfort in Duvenhage's Pan; flowers blue with yellow centres, 624.

The flower-stalk of these specimens is always exerted from 15–30 cm. beyond the surface of the water, whereas in the foregoing species the flower almost floats on the surface of the water.

62. MENISPERMACEAE.

1. *Cocculus hirsutus* (L.) Diels

Liane, common on trees in *Lonchocarpus* belt, 284.

2. *Desmonema cafrum* Miers.

Liane, frequent in *Lonchocarpus* belt; berries scarlet, 136.

This plant was observed to reach the tops of fairly tall trees such as *Albizzia*, etc. The stems are extremely succulent and very brittle. This is the first record of the species for the Transvaal.

63. ANNONACEAE.

1. *Hexalobus glabrescens* Hutch. and Dalz.

Small spreading tree on upper slopes of mountain, 155, 315.

2. *Artabotrys brachypetalus* Benth.

Tree about 2 metres high, on upper slopes of mountain, 321, 160.

70. CAPPARIDACEAE.

1. *Cleome diandra* Burch. (*Dianthera Petersiana* Klotszch; *D. burchelliana* Klotszch).

On ledge on slopes of mountain; flowers yellow, 612.

2. *Capparis tomentosa* Lam.

In *Lonchocarpus* belt near margin of pan, 13. A robust sprawler with festooning branches inclined to cover completely smaller trees and shrubs such as *Acacia* and *Salvadora*.

3. *Boscia Rehmanniana* Pest. forma.

In *Catophractes* belt, leaves and fruit shortly pubescent, 182a.

[This tree is fairly frequent in the sandy area north of the pan where it reaches a height of 4-5 metres. It differs from typical *B. Rehmanniana* in having pubescent leaves, whereas in the latter species they are always glabrous. *Lugard* 27 from Kwebe Hills, Ngamiland in Herb. Kew, resembles our gathering, but has glabrous leaves. The fruits, however, are pubescent and the flowers fasciculate (not a pedunculate inflorescence!) in which points it agrees with our gathering. Furthermore our specimen agrees in habit and in fruit with *Seiner* 78 from Bechuanaland in Herb. Hort. Bot. Berol. but in this specimen also the leaves are glabrous (H.G.S.).]

B. albitrunca Gilg et Benedict.

Between Zoutpan and Waterpoort, 276.

4. *Courbonia glauca* (Kl.) Gilg and Benedict (*C. camporum* Gilg and Benedict).

Between Waterpoort and Wylie's Poort, 328; between Zoutpan and Waterpoort, 247.

[Gilg and Benedict in Engl. Bot. Jahrb., 53, 217 (1915) distinguish between *C. glauca* and *C. camporum* on the grounds that the former is a woody shrub, whereas the latter is a herbaceous plant. Knowing our plant well in the field, these characters in my opinion are of no taxonomic value. *C. glauca* may either be a herbaceous plant 25 cm. or so high, or may reach a height of nearly 3 metres. It then is a shrub with a fairly lignified base. I have compared our gatherings with the types of *C. glauca* and *C. camporum* and have come to the conclusion that only one species is concerned (H.G.S.).]

5. *Cadaba termitaria* N. E. Br. (*C. macropoda* Gilg).

Very occasional near margin of pan, 34, 286.

[The shape and size of the leaves of this species is variable, a character of many plants growing in arid regions. Our specimens have much smaller leaves than the type of *C. termitaria*, but this difference alone does not justify specific distinction. Several small-leaved specimens in Herb. Kew were considered by Dr. J. Burt Davy to represent a distinct species, but in my opinion are merely forms of the above species (H.G.S.).]

6. **Maerua maschonica** Gilg

North of pan, 2.5-3 m. high, scrambling in *Salvadora sp.*, 43. Cattle are very fond of this plant.

M. Legatii Burt Davy

Shrub about 1 m. high in *Catophractes* belt, north of pan, 182.

76. CRASSULACEAE.

1. **Kalanchoe paniculata** Harv.

East side of pan at foot of mountain; flowers, yellow-green; leaves crenate, 561; scattered in *Catophractes* belt, north of pan, 184.

[The following described species are very closely allied: *K. paniculata* Harv., *K. multiflora* Schinz, and *K. pyramidalis* Schönl. In the descriptions they are distinguished by having either entire or crenate, sessile or petiolate leaves. Whether those characters are of taxonomic value is doubtful, since in our 561 both sessile and petiolate leaves are found on the same plant. There are a few sheets in Herb. Kew from Ngamiland and Rhodesia named by N. E. Brown as *K. multiflora* Schinz. Those specimens have crenate leaves, whereas Schinz describes the species as having entire leaves. It is somewhat doubtful whether the three species mentioned above, differing in leaf-shape only, a variable character in many succulents, should occur in the same geographic region. Study of plants in the field will probably show that the above view is correct (H.G.S.).]

77. SAXIFRAGACEAE.

1. **Vahlia capensis** Thunb.

In shade of shrubs above vlel behind homestead, 232a.

80. MYROTHAMNACEAE.

1. **Myrothamnus flabellifolia** (Sond.) Welw.

On northern rocky slopes of mountain, 615, 616, 171. This plant is perhaps one of the most remarkable found in Southern Africa. It is a dioecious shrub reaching a height of about 75 cm. and is usually gregarious. The male and female plants grow side by side. Some branches are decumbent and root adventitiously. Fragments of the plant which are shrivelled and dead will resurrect even after many years when soaked in water and assume colour and habit as in the living state (probably an imbibition movement).

85. LEGUMINOSAE.

1. **Albizzia Rogersii** Burt Davy

On rocky northern slopes of mountain, 170, 601; a tall tree with markedly spreading branches, locally fairly abundant.

2. **Acacia Bentharii** Rochebr.

In *Lonchocarpus* belt close to pan, 9; small tree, only about 1.5-2 metres high, on the very margin of pan, 470.

A. heteracantha Burch. (*A. litakunensis* Burch.; *A. spirocarpoides* Engl.).

Between Zoutpan and Waterpoort, 274: along eastern margin of pan, 150.

A. karroo Hayne

Frequent in *Lonchocarpus* belt between foot of mountain and pan, 11.

A. pennata Willd.

Above stream leading from the kloof behind homestead, 108.

A. permixta Burt Davy var. **glabra** Burt Davy

North side of pan forming dense patches, 41, 60. Plants reaching a height of 1-2 metres and forming dense scrub adjoining the halophytic fringe flora of the pan.

A. Senegal Willd. (*A. rostrata* Sim).

East side of pan, 300. Only a few specimens of this low-spreading tree about 5 metres high were found scattered along the eastern margin of the pan.

A. Woodii Burt Davy

In *Lonchocarpus* belt, 12. Large round-topped trees with rough bark and clustered branches, growing among *A. karroo*.

3. Dichrostachys glomerata (Forsk.) Hutch. and Dalz.

On northern slopes of mountain, 226.

4. Elephantorrhiza Burkei Benth.

In depression on northern slopes of mountain: small shrubs, occasional, fruiting specimens only, 175.

5. Burkea africana Hook.

On upper slopes of mountain, flat-topped trees, 319.

6. Copaifera mopane Kirk

Between Waterpoort and Wylie's Poort, 329.

7. Cassia delagoensis Harv.

Fairly frequent at foot of mountain east of pan, 563.

C. arachoides Burch. forma ?

Frequent in sandy soil, between Zoutpan and Waterpoort, 265: fairly frequent in very sandy area about 3 miles west of pan, 642.

[Our specimens match Moss and Rogers 36 from Messina, N. Transvaal, placed under *C. holosericea* Fresen. by Burt Davy in his Flora of the Transvaal, ii, 325 (1932). The flowers and fruits of true *C. holosericea* are much smaller and more hairy than those of our 265 and 642. *C. obovata* Collad. has fruits which differ by the conspicuous median crest on the lateral surfaces. Our plants are most closely allied to *C. arachoides* Burch. of which species they may be merely a pubescent form (H.G.S.).]

8. Pterolobium exosum (Gml.) Bak. f. (*P. lacerans* R. Br.).

Frequent in Wylie's Poort, 450. A conspicuous liane on account of its showy brilliant-red winged fruits, climbing to the tops of the highest trees in the forest-clad ravines.

9. Peltophorum africanum Sond.

Frequent on lower slopes of mountain; tree with erect racemes of bright yellow flowers, 107.

10. Pseudocadia zambesiaca (Bak.) Harms

At foot of mountain east of pan, 596: north-western slopes of mountain, 65. Frequent in area around pan; one of the tallest and most umbrageous trees with dark shiny foliage and stems up to 2 metres in diameter.

11. Calpurnia subdecandra (L'Herit.) Schweickerdt comb. nov.: [*Robinia subdecandra* L'Herit. in Stirp., Nov., 157, t. 75 (1784); *Calpurnia lasiogynae* E. Mey].

Farm "Elsteg," about 6 miles west of Louis Trichardt, 353.

12. Lotononis Bainesii Bak.

Frequent along furrow leading from large vlei west of homestead, 235.

13. Crotalaria Schinzii Bak. f.

Frequent in shade of trees at foot of mountain, south-east of pan, 580.

C. longistyla Bak. f.

Between Louis Trichardt and Pietersburg, frequent in sandy soil, 664.

C. inhabilis Verdoorn sp. nov.

Affinis C. australi sed pubescentia appressa et ovario tomentosa differt; affinis C. athrophyllae sed racemis laxioribus elongatioribusque, calyce brevior, floribus omnino flavis (nec purpureo-striatis), et suffrutice circiter 1 m. alto differt.

Suffrutex erectus, ± 1 m. altus, supra ramosissimus; ramuli petioli et pendunculi breviter griseo-appresso-pubescentes. *Folia* exstipulata, longe-petiolata, trifoliolata; petioli 6 cm. longi, internodiis et foliolis valde excedentes; foliola lineares vel anguste-oblonga, 1-3 cm. longa, 2-7 mm. lata, infra appresse pubescentes, supra glabrescentes, apice minute mucronata vel retusa, basi leviter cuneata, breviter petiolulata. *Racemi* oppositifolii vel terminales, elongati, 15-23 cm. longi, laxi, 10-15-flori. *Bractae* subulatae, 2 mm. longae. *Flores* flavi, ± 2 cm. longi, in medio racemorum plerumque 2 cm. distantes (*C. athrophyllae* 1 cm. distantes). *Pedicelli* circiter 10 mm. longi, breviter appresse griseo-pubescentes, infra medium 2-bracteolati. *Calyx* ± 8 mm. longus, appresse pubescens vel glabrescens, lobis deltoideis circiter 3 mm. longis. *Vexillum* dorso glabrum; carina dorso rotundata, 2 cm. longa, 7 mm. lata. *Ovarium* longe-stipitata, argenteo-tomentosa.

Transvaal.—Zoutpansberg distr.: On sandstone outcrop about 10 miles east of Waterpoort, Nov., Obermeyer, Schweickerdt and Verdoorn, 323.

C. inhabilis was found abundantly on a sandstone outcrop about 10 miles east of Waterpoort on the road to Wylie's Poort. It is an erect half-shrub up to about 4 ft. high and is densely branched above, which gives it a top-heavy or broom-like appearance. The clustered ultimate branchlets, which are much more slender than those from which they arise, and the very long-petioled leaves, the petioles being about three times as long as the leaflets, accentuate the broom-like appearance. The pure yellow flowers are borne on the branchlets in lax elongated racemes which may be either terminal or opposite the leaves.

14. Argyrolobium transvaalense Schinz

Fairly frequent on farm "Elsteg," about 6 miles west of Louis Trichardt, 351.

15. Indigofera circinnata Benth.

Between Zoutpan and Waterpoort, 275. A spiny slender shrub reaching a height of about 1 metre.

I. egens N. E. Br.

On upper slopes of mountain, 307.

I. flavicans Bak.

Frequent in sandy area east of pan, 296, 549.

I. Holubii N.E. Br.

Growing in cover and shade of bushes; flowers attractive, rosy pink or red, 480: east of pan, 544.

I. tettensis Klotzsch (*I. Baukeana* Vatke).

In shade of bushes along margin of pan; flowers pink; calyx small, 487.

I. sp. allied to *I. adenoides* Bak. f.

Common on north-western slopes of mountain, 154: frequent on rocky slopes east of pan, 566.

[Our specimens from *I. adenoides* having 3-5-foliolate leaves, minute stipules, fruits set with a few short glands and stems covered with minute almost sessile glands (H.G.S.).]

16. *Psoralea pinnata* var. *latifolia* Harv.

Vlei behind homestead; slender shrub attaining a height of about 5 metres, 202.

17. *Sylitra contorta* (N.E. Br.) Bak. f.

In sandy area north of pan near *Catophractes* belt, 508: between Zoutpan and Waterpoort, in open sandy soil, 267.

18. *Tephrosia zoutpansbergensis* Bremekamp

Very occasional, shrub 1-1.5 metres high, on northern slopes of mountain, 174.

T. capensis (Thunb.) Pers.

On lower slopes of the mountain, 531.

T. purpurea Pers. forma?

East of pan in shade of *Acacia*, 543.

T. euchroa Verdoorn sp. nov. ab *T. noctiflorae* floribus multo majoribus differt et ab specibus omnibus Transvaale valde distincta.

Suffrutex parvus plus minusve 30 cm. altus, multiramis, erectus vel rami decumbentes. *Rami* cano-pubescentes, glabrescentes, internodiis 2.5-3 cm. longis. *Folia* imparipinnata 2-6-juga, foliolis oblanceolata-oblongis vel oblongis, 1.5-3 cm. longis, 5-9 mm. latis utrinque cano-pubescentibus, superne ultimo glabrescentibus, apice minute mucronatis vel retusis petiolatis, petiolulis 3 mm. longis, dense cano-pubescentibus. *Stipulae* lanceolatae, acutae, 5 mm. longae, cano-pubescentes, 3-nervatae. *Racemi* folia longiores, laxiflori. *Flores* 1.5-2 cm. longi, rubicundi. *Bractae* lanceolatae, acutae, 4 mm. longae, cano-pubescentes. *Calyx* cano-pubescentis, in toto 5 mm. longus, lobis triangularibus 1-3 mm. longis. *Vexillum* extus appresse pubescens, suborbiculare, 1.5-2 cm. longum et latum; carina circiter 1.6 cm. longa, 1 cm. lata, quam vexillum paullo brevior et quam alae paullo longior. *Legumen* immaturum lineare, appresso-cano-pubescente.

Transvaal.—Zoutpansberg distr: On lower slopes of the Zoutpansberg, on farm "Zoutpan," among rocks, flowers pinky-red, April, 1934, *Schweickerdt* and *Verdoorn*, 529; on rocky N.W. slopes of the Zoutpansberg, November, 1932, *Obermeyer*, *Schweickerdt* and *Verdoorn*, 73 (type).

This is very distinct from all the known Transvaal species of *Tephrosia*. The silvery-grey colour of the bush and the pinkish-red flowers suggested the specific name. It is somewhat like *T. noctiflora* but has much larger flowers. The flowers of each raceme develop at different intervals and one finds several large open flowers while the buds above are still very immature.

19. *Sesbania aculeata* Pers.

Herbaceous, about 60 cm. high, near margin of pan, 454.

20. *Ormocarpum trichocarpum* (Taub.) Harms (*O. setosum* Burt Davy).

Small tree at foot of mountain, south-east of pan, 582.

21. *Stylosanthes mucronata* Willd.

In dry rocky soil between Waterpoort and Wylie's Poort, 336.

22. *Lonchocarpus capassa* Rolfe

Dominant, large tree in area between pan and foot of mountain, 8.

23. *Abrus laevigatus* E. Mey.

In vlei behind homestead, 206.

24. *Glycine javanica* L.

Twinner on trees along stream leading from kloof; flowers white in long erect racemes, 597.

25. *Neorautanenia edulis* C.A. Sm.

Sandy area about 3 miles west of pan, 645; in *Catophractes* belt, 183: farm "Kromhoek," north of Blaauwberg, 81: between Zoutpan and Waterpoort, 271.

26. *Rhynchosia minima* DC.

Twining in *Capparis* near margin of pan, 473.

27. *Eriosema psoraleoides* (Lam.) Don (*E. cajanoides* Benth.).

In vlei soil behind homestead, 594.

28. *Otoptera Burchellii* DC.

Frequent in sandy area about 3 miles west of pan, 643: farm "Eyem," north of Blaauwberg, 100.

29. *Dolichos Schlechteri* (Harms) Burt Davy

Creeping in small shrubs in *Catophractes* belt, 185.

[This species was originally described as *Phaseolus Schlechteri* Harms in Engl. Bot. Jahrb. XXX, 91 (1901). In the type description Harms makes no mention of the shape of the stigma, although at some time or other he apparently was somewhat in doubt as to which genus to refer it to. Burt Davy in his Flora of the Transvaal cites this species under *Dolichos Schlechteri* Harms MS apparently not having been aware of the fact that Harms had described it under another name. The penicillate stigma is not characteristic of *Phaseolus* and Burt Davy has correctly aligned this plant with others at present under *Dolichos* (H.G.S.).]

30. *Alistilus bechuanicus* N.E.Br.

On upper slopes of mountain, a creeping procumbent herb, peduncles erect, flowers pink, 317.

86. GERANIACEAE.

1. *Monsonia glauca* Knuth

Very sandy area about 3 miles west of pan, 640.

90. ZYGOPHYLLACEAE.

1. *Tribulus terrestris* L.

Under cover of *Acacia* east of pan, 539.

T. zeyheri Sond.

Along roadside, Vivo, 650: between Zoutpan and Waterpoort, 263: under thorn fence of kraal east of pan, 299.

2. *Balanites australis* Bremekamp

West of pan, scattered but frequent, 479: near margin of pan, 15, 33. A small, very thorny tree.

91. RUTACEAE.

1. *Toddaliopsis Bremekampii* Verdoorn

Frequent on northern slopes of mountain behind homestead; a shrub or small tree with tri-foliolate leaves; flowers small, greenish; fruits warted, 66, 156, 567.

2. *Fagara capensis* Thunb.

Farm "Elsteg," about 6 miles west of Louis Trichardt, in shade on rocky slopes, 346, 347. Two trees growing near together, one 3 or 4 ft. high with small leaves (probably a young tree) and the other about 8 ft. high with larger leaves (I.C.V.).

3. *Clausena anisata* (Willd.) Hook. f. (*C. inaequalis* var. *abyssinica* Engl.).

Farm "Elsteg," about 6 miles west of Louis Trichardt; small tree, bad odour, 356.

92. SIMARUBACEAE.

1. *Kirka pubescens* Burt Davy

Large spreading tree, fairly frequent on northern slopes of mountain, 163.

93. BURSERACEAE.

1. *Commiphora pyracanthoides* Engl.

North of pan in *Catophractes* belt; shrub; flowers red and yellow, 48, 49, 512: on slopes of mountain; small tree with greenish stems, 159.

C. Marlothii Engl.

In dry parts of kloof behind homestead; tree with papery bark, 121: frequent on northern slopes of mountain, 165.

C. calcicola Engl.

North side of pan near *Catophractes* belt; flowers red; leaves 3-foliolate; fruit red, oblique, 180, 511: between Louis Trichardt and Pietersburg, 663.

C. cinerea Engl.

On lower slopes of mountain behind homestead, tree about 8 metres high, 152.

C. sp. near *C. mollis* and *C. Welwitschii* but material insufficient for specific identification.

Farm "Eyem," north of Blaauwberg, 95.

94. MELIACEAE.

1. *Ptaeroxylon obliquum* (Thunb.) Radlk.

In upper drier parts of kloof behind homestead; small slender tree, 118.

2. *Entandophragma caudatum* Sprague

On northern slopes of mountain; tree about 10 metres high; leaves with long drip-points, 306.

3. *Ekebergia Meyeri* Presl

Above stream leading from kloof behind homestead; spreading tree, 112.

98. EUPHORBIACEAE.

1. *Pseudolachnostylis maprouneaeifolia* Pax

Northern slopes of mountain, 74, 75, 117.

2. *Fluggea virosa* Baill.

Near foot of mountain in *Lonchocarpus* belt, 6, 10, 521.

3. *Phyllanthus reticulatus* Poir

At foot of mountain, east of pan; tree about 8 metres high, 620.

4. *Bridelia mollis* Hutch.

In kloof behind homestead, 599b; northern slopes of mountain, 243.

5. *Androstachys Johnsonii* Prain

Tree, 5-8 metres high, very frequent in Wylie's Poort, 327.

6. *Croton gratissimus* Burch.

Fairly frequent on northern slopes of mountain; small tree, 157, 169.

C. megalobotrys Müll. Arg. (*C. Gubouga* S. Moore).

Tree, about 5 metres high, near homestead, 4: beside stream leading from kloof, 106.

C. pseudopulchellus Pax

On upper slopes of mountain, locally abundant; small shrub, about 1 metre high, 303, 316.

7. Acalypha glabrata Thunb.

Farm "Elsteg," about 6 miles west of Louis Trichardt; shrub, about 2.5 metres high, 348.

A. indica L.

In shade of *Acacia*, east of pan, 535.

8. Tragia Okanyua Pax

Northern slopes of mountain, twining in *Croton sp.*, 283.

9. Plukenetia africana Sond.

Climber, in *Acacia sp.*, east of pan, 552.

10. Jatropha erythropoda Pax et Hoffm.

In *Catophractes* belt, 194: on farm "Zoutpan," on road to Waterpoort, 262.

J. zeyheri Sond. forma.

Near farm "Eyem," north of Blaauwberg, 101.

[This specimen differs from *J. Schlechteri* Pax in the more strongly lobed, less pubescent and shorter petioled leaves and the glabrous calyx. In the latter character our plant also differs from *J. zeyheri* Sond. but approaches it with regard to leaf-shape and length of petiole. Since the last two characters appear to be of some importance in the delimitation of the S. African species of this genus, I place our gathering under the above species and regard it as a form until more material becomes available for study (H.G.S.).]

11. Spirostachys africana Sond.

In *Lonchocarpus* belt near homestead, tree 5-7 metres high, 77: almost on margin of pan, 35.

12. Euphorbia aeruginosa Schweickerdt.

On northern rocky slopes of mountain, 151, 688.

E. Cooperi N.E. Br.

On northern slopes of mountain near homestead, 649.

E. Gürichiana Pax

In *Catophractes* belt; small bush, branched at base, up to 50 cm. high; flowers yellow or green, 178, 513.

E. Tirucalli L.

Plentiful in parts of Wylie's Poort, 676.

E. transvaalensis Schltr.

On rocky slopes in Wylie's Poort, 369.

13. Monadenium Lugardae N.E.Br.

On mountain slopes east of homestead, forming patches; stems decumbent, rooting where they touch the ground, about 40 cm. high, 648.

14. Cluytia pulchella var. obtusata Sond. ?

Shrub, near waterfall on farm "Elsteg," about 6 miles west of Louis Trichardt, 366.

101. ANACARDIACEAE.**1. Rhus Gueinzii Sond.**

On margin of vlei, west of homestead, 231.

R. pyroides var. **gracillis** (Engl.) Burt. Davy

In marshy soil near vle, 222.

R. transvaalensis Engl.

Farm "Elsteg," about 6 miles west of Louis Trichardt, 365.

103. CELASTRACEAE.**1. Cassine Schlechteri** (Loes.) Davison

Small tree, in *Lonchocarpus* belt beyond vle, bearing somewhat pointed ripe fruits, 577: same locality, tree, ripe fruits globose, 576: small tree, on northern slopes; fruits immature, 237.

Rehmann, 6459 from Houtbosch, Transvaal, referred to the above species in Herb. Kew has oblong apiculate fruits as in our No. 577. In the latter sheet the apiculus of the fruits is more pronounced. No. 576 has spherical fruits without an indication of an apiculus, but does not differ from 577 in other respects. Until more material, both flowering and fruiting, has been studied, it is impossible to decide whether the above specimens represent distinct varieties (or even species) or whether only one species variable with regard to leaf size and shape of fruits is involved. In the type description of *Mystroxydon Schlechteri* [Loes in Engl. Bot. Jahrb., 28, 159 (1901)] no mention of the fruits is made.

104. HIPPOCRATEACEAE.**1. Hippocratea longipetiolata** Oliv.

Between Zoutpan and Waterpoort; small shrub, with long spreading branches, 254.

106. SAPINDACEAE.**1. Cardiospermum alatum** Bremekamp and Obermeyer

East of pan, climber, on *Gossypium*, 559.

109. RHAMNACEAE.**1. Zizyphus mucronata** Willd.

Between Waterpoort and Wylie's Poort, 326.

2. Berchemia discolor (Kl.) Hemsl.

Northern slopes of mountain, 279: frequent in *Lonchocarpus* belt, 278.

111. VITACEAE.**1. Cissus lonicerifolius** C. A. Smith

Farm "Eyem," north of Blaauwberg; shrub, 2 metres high; leaves folded, pungent odour, 96.

Usually a shrub, varying from 1-3 m. high, much branched; tendrils usually only found near end of branches.

C. quadrangularis L.

Between Zoutpan and Waterpoort, climbing in small shrubs, 261.

C. simulans C. A. Smith

Farm "Elsteg," about 6 miles west of Louis Trichardt, luxuriant climber, 361.

C. unguiformifolius C. A. Smith

Between Waterpoort and Wylie's Poort, abundant, procumbent, 330.

112. TILIACEAE.

1. *Corchorus pongolensis* Burt & Greenway?

On lower slopes of mountain behind homestead, 67. A slender shrub, up to 130 cm. high, differing from the type by having somewhat shorter bracts, but otherwise agreeing fairly well.

[Our plant is allied to *C. Kirkii* N. E. Br. but may be readily distinguished by the indumentum (H.G.S.).]

C. asplenifolius Burch.

Under *Acacia*, east of pan, 536, 541.

2. *Grewia flava* DC.

In open parts of *Catophractes* belt, 56.

G. hexamita Burr.

Shrub, about 3 metres high, near margin on east of pan, 149.

G. retinervis Burr.

Near homestead, under cover of *Terminalia*, 2: on slopes of mountain behind homestead, 244.

G. occidentalis L.

Tree, 7-8 metres high, in Wylie's Poort, 341.

G. Schweickerdtii Burr. sp. nov.

Frutex 8-10 pedes altus. *Rami* cortice rubro, ramuli breviter virgati, superne pilis stellatis multi-ramosis, sat longis, flavidis plus minus interrupte villosi. *Stipulae* lanceolatae. *Petiolus* in latere longiore usque 6 mm. longus, validus, flavido-villosus; lamina basi valde obliqua, in altero latere rotundata, in altero auriculari formiter producta, cordata, praeterea ambitu elliptica vel elongato-elliptica, maxima visa 5 cm. circ. longa, 3-4 cm. lata, supra glabra, nitens, rugosa, nervis nervulisque impressis, sat dense reticulata, subtus pallide flavido-velutina, costa atque nervis lateralibus minus pilosis i.e. colore brunneo notatis, nervatione ulteriore vix conspicua, margine revoluta, leviter crenato, apice plerumque rotundato, rarius subapiculato. *Cymae* floriferae axillares, solitariae, 1-3-florae, in modo ramulorum pallide fusco-flavido-villosae. *Pedunculus* 0.5-1.0 cm. circ. longus. *Pedicelli* bracteis oblongo-lanceolatis vel lanceolatis, intus glabris, extra pubescentibus suffulti, pedunculo subaequilongi. *Albastra* oblonga. *Flores* speciosi. *Sepala* 2.4 cm. longa, linearia, extra pilis stellatis brevissimis atque longis fusco-flavidis multiramosis interrupte sequentibus vestita. *Petala* ungui subcircularia 4 mm. in diam. circ. metiente, dorso pilosulo, antice supra aream glanduligerum squamiformiter libero, dense, late, minus late in lateribus flavido-tomentoso; lamina late obovata vel potius suborbicularis, apice leviter excisa. *Androgynophorum* supra petalorum unguem flavide villosum conspicue productum, dein stamina numerosa, 1.5 cm. fere longa, atque gynaeceum flavido-villosum obovatum praebeus. *Stylus* longitudine staminum, glaber, gynaeceo subito impositus; stigmata dilatata, applanata, late rotundata. Ovula pro loculo 8, biseriata, pro serie 4.

Transvaal.—Zoutpansberg distr.: Farm "Zoutpan 193," in kloof behind homestead, shrub, 8-9 ft. high, November, 1921, Obermeyer, Schweickerdt and Verdoorn, 120.

G. Schweickerdtii is closely allied to *G. hexamita*, but differs in having much longer petioles, large flowers and much larger leaves.

G. sp. near *G. flava* DC. (Material too poor for description.)

Shrub, about 3 metres high, near homestead, 147.

113. MALVACEAE.

1. *Abutilon austro-africanum* Hochr.

Small shrub, near eastern margin of pan, 144 : between Zoutpan and Waterpoort, 270 : in shade of *Acacia* sp., east of pan, 558.

2. *Sida cordifolia* L.

Small shrub, about 60 cm. high, frequent in open patches east of pan, 556 : frequent in vlei soil and in shade of trees in *Lonchocarpus* belt, 234.

S. flexuosa Burtt Davy

Frequent in sandy soil between Zoutpan and Waterpoort, 253.

S. Hoepfneri Guerke.

Shrub, about 1 metre high, along eastern margin of pan, 148.

3. *Pavonia Burchellii* (DC.) R. A. Dyer

Small shrub, about 20 cm. high, in sandy soil of *Catophractes* belt, 506, 189.

P. dentata Burtt Davy

On rocky ledges in drier upper parts of kloof behind homestead, 126 : on rocky mountain slopes, 167 : in Wylie's Poort, on rocks, 671.

4. *Hibiscus micranthus* L.

Shrub, about 1 metre high ; flowers small, white, turning pink or red when folding up again ; in *Catophractes* belt, 504, 195.

H. dongolensis DC.

On northern slopes of mountain near pan, 575a.

H. physaloides G. and P.

Near homestead, in *Lonchocarpus* belt ; flowers yellow with red blotch at base of petals, 25.

H. physaloides G. and P. forma ?

Frequent along eastern margin of pan, flowers red or yellow with red blotch at base of petals, 145, 555. [In foliage and habit the above gatherings resemble *H. Schinzii* Guerke very closely but have flowers twice the size. In Herb. Hort. Bot. Berol. several sheets named *H. physaloides* forma matched our gatherings. I am inclined to think that our specimens and those in Berlin Herb. represent a distinct variety with *H. Schinzii* as closest affinity, since the latter as well as our plants are prostrate in habit, whereas *H. physaloides* apart from having much larger leaves is usually an erect under-shrub (H.G.S.).]

H. praeteritus R. A. Dyer

Foot of mountain, east of pan, in shade of trees ; about 2 metres high, 575 ; between Zoutpan and Waterpoort, 257 : at northern end of Wylie's Poort, 338. This plant had white flowers, which, however, turned red on drying : in all other respects it agreed with the typical form.

H. intermedius A. Rich. var. *aristaevalvis* Guerke

Under small *Acacia*, on margin of pan : flowers creamy-yellow, 32, 476. These specimens agree well with *Lüderitz* 82 from S.W. Africa in the Herb. Hort. Bot. Berol.

5. *Gossypium africanum* Watt (*G. transvaalense* Watt).

Frequent in scrub and bush east of pan, 564, 135.

[I find no specific difference between *G. africanum* and *G. transvaalense*. Both occur in the same geographic area (H.G.S.).]

114. BOMBACACEAE.

1. *Adansonia digitata* L.

On northern rocky slopes behind homestead, 69.

The South African material which we have so far examined differs from true *A. digitata* L. from West Africa in the following characters: The flowers and fruits are shortly pedunculate and the petals never reflex as shown in the figure in *Memorias de Sociedade Broteriana* I, 50 et t. 5 (1930). The plant figured was from Portuguese Guinea which is near the type locality and thus may be considered to be true *A. digitata* L. If any value is to be attached to the differences recorded above the South African form may deserve varietal rank. Further investigation, however, is necessary before any decisive step can be taken.

115. STERCULIACEAE.

1. *Melhanina Rehmannii* Szyszyl.

Near homestead, 188a.

2. *Hermannia boraginiflora* Hook.

Lower slopes of mountain, east of pan; flowers pale mauve, 142, 562.

H. Holubii Burtt Davy

In sandy soil near Vivo; flowers brick red, 652: in shade of *Acacia* trees near margin of pan, 486.

H. grisea Schinz

In open soil, east of pan; flowers pale pink to brownish, 553.

3. *Waltheria americana* var. *indica* K. Schum.

In open soil, east of pan, common, 554.

4. *Sterculia Rogersii* N. E. Br.

In sandy area west of pan, 87. A small (stunted?) shrub with a succulent bole.

116. OCHNACEAE.

1. *Ochna atropurpurea* DC.

Near summit of northern slopes of mountain, 312.

2. *O. sp. nov.*

Between Waterpoort and Wylie's Poort, 335.

[This specimen matches *Rogers* 19398 from Messina and *Baines* s.n. from "S.A. Gold Fields" in *Herb. Kew.* It is very probably an undescribed species. *Rogers* 19398 is quoted under *O. pretoriensis* by Phillips in *Bothalia* I, ii, 95 (1922) but does not belong to that species, differing from it in leaf character as well as the articulation of the pedicel (H.G.S.).]

117. GUTTIFERAE.

1. *Hypericum Lalandii* Choisy.

Along stream leading from vlel behind homestead, 204.

2. *Garcinia Livingstonei* And.

Occasional trees, on lower rocky slopes of mountain; flowers sweetly scented; fruits orange-coloured, oblique, fleshy, edible, 71, 62.

123. FLACOURTIACEAE.

1. *Trimeria grandifolia* (Hochst.) Warb.

Farm "Elsteg," about 6 miles west of Louis Trichardt, 354.

124. TURNERACEAE.

1. *Piriqueta capensis* (Harv.) Urb.

Between Waterpoort and Wylie's Poort, 339.

125. PASSIFLORACEAE.

1. *Adenia repanda* (Burch.) Engl.

Between Zoutpan and Waterpoort, in open sandy soil, climbing over small bushes, not very frequent; tuber subterranean, 246.

137. COMBRETACEAE.

1. *Combretum apiculatum* Sond.

In upper drier parts of kloof behind homestead, 603.

C. *mossambicense* (Klotzsch) Engl.

Near eastern margin of pan, liane on *Lonchocarpus*; flowers white; anthers red, 143.
This constitutes the first record of the species for the Transvaal.

2. *Terminalia prunioides* Laws.

Tree, \pm 8 metres high, frequent in *Catophractes* belt, 191.

T. *Rautanenii* Schinz

Adjoining farm "Zoutpan," near Vivo, 83. A shrubby tree, attaining a height of 4-5 metres with much the habit of an *Ehretia*. It is fairly frequent in the sandy areas adjoining the pan. This is the first record of the species from the Transvaal.

T. *sericea* Burch.

In *Lonchocarpus* belt adjoining the homestead, 1.

138. MYRTACEAE.

1. *Syzygium cordatum* Hochst.

On slopes behind homestead, 63.

140. ONAGRACEAE.

1. *Jussiaea angustifolia* Lam.

Growing in bed of periodic stream leading from mountain to south-eastern margin of pan, 559a.

143. UMBELLIFERAE.

1. *Hydrocotyle asiatica* L.

Near vlei to west of homestead, 225.

H. *verticillata* Thunb.

Frequent along stream leading from kloof, 200.

2. *Steganotaenia araliacea* Hochst.

In Wylie's Poort, fairly frequent; chasmophyte, 331.

146. MYRSINACEAE.

1. *Maesa lanceolata* Forsk.

Along water-course leading to kloof, 113.

147. PRIMULACEAE.

1. *Samolus Valerandi* L.

Farm "Elsteg," about 6 miles west of Louis Trichardt, abundant on banks of stream, 363.

149. SAPOTACEAE.

1. *Chrysophyllum magalismontanum* Sond. (*C. Wilmsii* Engl.).

Near summit of northern slopes of mountain, 305.

2. *Mimusops Zeyheri* Sond.

Farm "Elsteg," 6 miles west of Louis Trichardt, 361a.

150. EBENACEAE.

1. *Royena* sp. (not matched at Kew).

Near camp; fruit small, 277.

2. *Euclea divinorum* Hiern

Farm "Eyem," north of Blaauwberg, 98.

E. Guerkei Hiern

Farm "Elsteg," about 6 miles west of Louis Trichardt, 358.

E. lanceolata E. Mey. ex Drège ?

Farm "Elsteg," about 6 miles west of Louis Trichardt, 371.

E. multiflora Hiern

In deep sandy soil, east of pan, 622.

151. OLEACEAE.

1. *Jasminum stenolobum* Rolfe

Farm "Eyem," north of Blaauwberg; small erect bush, about 1 m. high, 92.

152. SALVADORACEAE.

1. *Salvadora australis* Schweickhardt sp. nov.

Affinis S. persicae Garcin ex Linn. et *S. oleoidi* Decne, sed ab illa indumento persistente calyce valde lobato antheris multo minoribus stylo distincto, ab hac antheris maioribus connectivo haud producto stylo distincto indumento persistente differt.

Frutex divaricato-ramosus vel arbor usque ad 8 m. alta; rami iuniores minute et dense cinereo-puberuli, teretes; internodia ad 2 cm. longa, 2 mm. diametro. *Folia* breviter petiolata vel fere sessilia, spatulata vel oblanceolata, obtusa, basin versus sensim attenuata, usque ad 5 cm. longa, et 1 cm. lata, integra, utrinque minute sed dense puberula, nervis infra prominentibus supra inconspicuis. *Flores* viridi-flavi, in paniculis terminalibus vel axillaribus dispositi. *Paniculae* circiter 2 cm. longae, multiflorae. *Bractae* minutae, 0.75 mm. longae, ovatae, dense cinereo-puberulae, minute ciliolatae. *Calyx* circiter 2 mm. longus, extra dense et minute puberulus, dimidio lobatus, lobis reflexis obtusis dense et minute ciliolatis. *Corolla* plus minusve 3 mm. longa, profunde lobata; lobi triangulares, acuti, sub anthesi reflexi. *Stamina* corolla breviora; antherae minutae, fere 0.75 mm. longae, glandulis interstaminalibus distinctis sed minutis. *Ovarium* circiter 1 mm. diametro, globosum, minute puberulum; stylus circiter 0.25 mm. longus, distinctus, stigmate inconspicuo. *Fructus* 6 mm. diametro, semitranslucens, globosus, minute puberulus.

PORTUGUESE EAST AFRICA.—Mapae: Guija, in bush country in sandy soil, about 1 mile from the Limpopo River, July, *Lea*, 5 (syn-type flowers).

TRANSVAAL.—Zoutpansberg distr.: Farm "Zoutpan 193," on northern slopes of Zoutpansbergen, tree about 8 m. high, November, Obermeyer, Schweickerdt and Verdoorn, 18 (syn-type fruits); *Keet in Forest Dept. Herb.*, 6833; Messina, Pole Evans, 1453.

NATAL.—Zululand: Mkuzi, on Lebombo Flats, Galpin, 13320.

This is closely related to the Indian species *S. oleoides* Dec. from which it may be distinguished by having larger anthers, a connective which is never produced and columnar style. I have not observed the latter in either *S. persica* or *S. oleoides*. The persistent indumentum on branches, leaves and floral parts is a character by which the southern African species may be at once recognised.

153. LOGANIACEAE.

1. *Strychnos Schumanniana* Gilg

On rocky ledges behind homestead, 64.

S. innocua Del. (*S. Quaqua* Gilg; *S. dysophylla* Benth.).

Occasional on northern slopes of mountain, 161.

2. *Anthocleista zambesiaca* Bak.

In kloof behind homestead, 115.

This is probably one of the most conspicuous of South African forest trees, always growing in very damp situations, usually in ravines. It is more or less 30 metres high and is not much branched. The branches are erect and bear a crown of large simple leaves near their apex. The flowers are gardenia white.

3. *Lachnopylis montana* C. A. Smith

Farm "Elsteg," about 6 miles west of Louis Trichardt, 344.

155. APOCYNACEAE.

1. *Landolphia Kirkii* Dyer var. *delagoense* Dew.

Upper slopes of mountain, fairly common; shrub, 1.5 metres high, 304, 172.

2. *Pachypodium Saundersii* N. E. Br.

Near roadside among rocks in Wylie's Poort, 668.

3. *Strophanthus Gerrardii* Stapf

Frequent in bush, west of homestead, 579. This interesting liane is fairly common in the dense bush at the foot of the mountain. It climbs to the tops of tall trees and not much of its foliage is visible. The two-winged, twisted stems, however, attract one's attention immediately (two opposite wings run vertically throughout the length of the internode with the plane of the wings at right angles to those of the internodes above and below).

156. ASCLEPIADACEAE.

1. *Cryptolepis obtusa* N. E. Br.

Twiner in *Cassia*, in bush west of homestead, 591.

2. *Stomatostemma Monteiroae* (Oliv.) N. E. Br.

On upper slopes of mountain; liane on *Commiphora* sp., 320.

3. *Asclepias Burchellii* Schltr.

In open veld near homestead, 23.

4. *Secamone Gerrardi* Harv.

Farm "Elsteg," about 6 miles west of Louis Trichardt, 352.

S. zambesiaca var. **parvifolia** N. E. Br.

Twinner on *Euphorbia Cooperi*, east of homestead, 138.

5. Ceropegia cimiciodora Obermeyer

Farm "Chapudi," between Waterpoort and Zoutpan, creeping in low bushes, 322.
A fleshy-stemmed creeper with striking flowers.

6. Tavaresia grandiflora (K. Schum.) Berger

Between Waterpoort and Zoutpan, in sandy soil under cover of *Acacia* scrub, 413.

7. Caralluma atosanguinea N. E. Br.

Farm "Chapudi," between Zoutpan and Waterpoort, 446.

C. Schweickerdtii Obermeyer sp. nov. (*C. carnosa* Schweickerdt in Flowering Plants of South Africa, XV, plate 592, non Stent).

Caules carnosi, erecti vel adscendentes, basi ramosi, 4-angulati, 17 cm. alti, 3-4-5 cm. diam. (dentibus inclusis), glabri, virides, brunneo-maculati; anguli dentibus patentibus. deltoideis, 1.5 cm. longis, compressis instructi. *Flores* ad apicem ramorum, 1-3 aggregati. *Pedicelli* ad 3 mm. longi. *Sepala* 4 mm. longa, lanceolata, acuta, sinu flagellis instructi. *Corolla* 1 cm. longa, 1-2 cm. in diam., campanulata, extus glabra, viridia, intus purpureo-rubra, paullum cremeo-maculata, papillosa, aliquando pilis bulbosis, clavatis indutis; tubus annulo pentagono, parvo, instructis; lobi deltoidei, 5 mm. longi, 7 mm. lati, paullum patentes. *Corona* exterior crateriformis, lobi aliquando lyrati, patentes, ad apicem paullum concavi vel bifidi roseo-cremei; lobi interior supra antherarum incumbenti, maculati, dorso, carnosio-gibbosi.

TRANSVAAL.—Zoutpansberg distr.: Farm "Chapudi," near Waterpoort, in sand, Obermeyer, *Schweickerdt* and *Verdoorn*, 411 (*National Herbarium, Pretoria*, 19597; *Herb. Transvaal Museum*, 34945).

This species is closely related to *C. Keithii* Dyer but may be distinguished as follows: In *C. Keithii* the corolla tube is thin and minutely verrucose, different to the fleshy, densely papillate lobes. There is, however, no sharp distinction between the corolla-lobes and the tube in *C. Schweickerdtii*. The very peculiar bulbous-based clavate unicellular hairs tipping some of the long papillae are smaller and fewer, while the margin of the corolla-lobes is not fringed with a row of minute hairs; there are, however, some scattered over the whole inner surface. The outer corona-lobes of *C. Schweickerdtii* bend outwards and are more or less lyre-shaped, while in *C. Keithii* they are bifurcate and somewhat incumbent over the staminal column. The inner corona lobes are mottled with purple, while the minute emarginate lobe, spreading slightly between the outer corona-lobes, present in *C. Keithii*, is absent. The five intersepalary flagellae are present in both species, but absent from *C. carnosa* Stent. From this species it may be distinguished by the different colour and smaller size of the corolla, etc.

Between Waterpoort and Zoutpan, 411. This specimen was figured in Flowering Plants of South Africa (plate 592) as *C. carnosa* Stent; Miss Obermeyer, however, rediscovered *C. carnosa* in the type locality and found that our plant differed considerably from it. She has therefore given the above name to our specimen.

C. maculata N. E. Br.

Near Waterpoort, fairly frequent but scattered, 660. This species is rather remarkable as it has horizontal rhizomes at a depth of about 10 cm. below the surface of the soil. Aerial shoots arise from these at some distance from each other. This plant was figured in Flowering Plants of South Africa as *C. grandidens* Verdoorn but was found by Dr. Schweickerdt at Kew to be *C. maculata* N. E. Br. (See Kew Bull., 1935.)

8. Stapelia clavicornia Verdoorn

Growing on rocky ledges in Wylie's Poort, 414. Apparently a very rare species since only a few plants have so far been found and only from that locality.

S. Getlieffii Pott

Along margin of pan, fairly frequent, 477 : between Zoutpan and Waterpoort, fairly common, 444.

The colour of the flowers of this species is rather variable. Flowers with dark wine-coloured markings and hairs on the corolla and others with very pale, almost yellow corollas and but faint markings were observed on plants growing in the same patch. The inner corona wings also vary but this variation is not constantly associated with the variations in the colour of the corolla.

S. gigantea N. E. Br.

On rocky ledge on slopes behind homestead, 70.

S. nobilis N. E. Br.

Growing in large patches under a large *Acacia* tree near Zoutpan, 445.

S. kwebensis N. E. Br.

At "Vivo," west of Zoutpan, 406 : between Zoutpan and Waterpoort, 662.

9. Huernia zebrina N. E. Br. var. **magniflora** Phillips.

Near farm "Chapudi," between Zoutpan and Waterpoort, 416, 443, 657, 658, 659. Colour forms were noted among these specimens such as black disk and yellow lobes marked with red stripes, and red disk and red lobes with yellow stripes. The outer corona varied too, sometimes appearing pincher-like and on flowers in close proximity (not obviously the same plant) with outer corona not pincher-like.

10. Pergularia extensa (Jacq.) N. E. Br.

Climber, on shrubs and bushes, fairly frequent in sandy areas around pan ; petals green, with densely ciliate margins, 3, 90.

11. Fockea augustifolia K. Schum. ?

In *Catophractes* belt, north of pan, 187 (poor specimen).

157. CONVULVULACEAE.**1. Seddera suffruticosa** (Schinz) Hall. f. var. **hirsutissima** Hall. f.

In sandy soil of *Catophractes* belt, 177, 509.

2. Ipomoea adenioides Schinz.

Fairly frequent in *Catophractes* belt ; flowers exquisite, white with wine-coloured throat, opening at sundown, 181.

I. quinquefolia var. **purpurea** Hall. f.

On sandy soil, climbing over low scrub, between Louis Trichardt and Pietersburg, 665.

I. Lugardi var. **parviflora** Rendle

In shade of *Acacia*, east of pan ; flowers bluish-pink with dark pink throat, 542.

3. Merremia pinnata (Hochst.) Hall. f.

On north-east side of pan, in shade of *Acacia* ; flowers bright yellow, 568.

[The specimens from Trop. Afr. in Herb. Kew are more robust and more pubescent than the above gathering (H.G.S.).]

159. BORAGINACEAE.**1. Cordia ovalis** R. Br.

Small tree, in *Catophractes* belt, very occasional, 192. First record of the species for the Transvaal.

2. **Ehretia rigida** (Thunb.) Druce
North side of pan, fairly frequent, 44, 45.
3. **Heliotropium curassavicum** L.
On very margin of pan, a typical halophite, 288, 465.
- H. lineare** C. H. Wright
Between Zoutpan and Waterpoort, in open sandy soil, 248.
- H. Nelsoni** C. H. Wright
Very occasional under *Acacia*, near margin of pan, 20, 482, 510.

160. VERBENACEAE.

1. **Lippia asperifolia** Rich.
In *Lonchocarpus* belt and on northern slopes of mountain, 7, 129, 519, 520.
2. **Clerodendron myricoides** R. Br.
At upper end of kloof behind homestead, 602. The leaves of this specimen are more coarsely serrate than in the material from Trop. Africa.
- C. ternatum** Schinz
Very sandy area, about 3 miles west of pan, 641.
- C. simile** Pearson
Undershrub, on farm "Chapudi," between Zoutpan and Waterpoort, 252.

161. LABIATAE.

1. **Leonotis dysophylla** Benth.
Under tree in vlei area on slopes above pan, up to 3 metres high, 229.
2. **Leucas glabrata** R. Br.
Farm "Elsteg," about 6 miles west of Louis Trichardt, 364.
- L. sexdentata** Skan
In shade and in open veld near margin of pan, 491.
3. **Aeolanthus Rehmannii** Guerke
On rocky slopes, rooting in fissures, Wylie's Poort, 670.
4. **Endostemon tereticaulis** (Poir) Ashby (*E. ocimoides* Bremekamp).
Frequent among loose stones on eastern margin of pan; flowers purple, 140.
5. **Pycnostachys reticulata** Benth.
In shade along bank of stream, behind homestead; flowers a beautiful blue, 518.
- P. densiflorus** Cooke
In sandy soil, between Louis Trichardt and Pietersburg, 447.
6. **Ocimum americanum** L.
Near margin of pan; flowers small, pink and white, 494.
7. **Becium obovatum** N. E. Br.
Near margin of pan under cover of *Acacia*; flowers dirty white with mauve markings; stamens long exserted, 475.
8. **Hemizygia canescens** (Guerke) M. Ashby (*Orthosiphon canescens* Guerke).
On slopes of mountain behind homestead; small bush with strong odour, 613.

162. SOLANACEAE.

1. *Solanum incanum* L.

Near margin of pan, growing in association with *Acacia* scrub, 134.

S. panduriforme E. Mey.

East fringe of pan, common, 547.

S. kwebense N. E. Br.

In *Catophractes* belt; flowers white, 54: flowers purple, 57. First record of this species for the Transvaal.

2. *Lycium* sp.

Five collections were made (22, 39, 42, 474, 503) which have not been specifically identified and a revision of the genus appears very necessary.

163. SCROPHULARIACEAE.

1. *Aptosimum lineare* Marl. and Engl.

In sandy soil, between Louis Trichardt and Pietersburg, 666: between Zoutpan and Waterpoort in open sandy soil, 266: Vivo, 655.

A. patulum Bremekamp

Under *Acacia*, east of pan, 565: at foot of mountain, near upper vlei, 581.

2. *Peliostomum leucorrhizum* E. Mey.

Farm "Eyem," north of Blaauwberg, 94.

3. *Limosella maior* Diels

In stream leading from kloof and vlei, 216.

4. *Ilysanthes dubia* (L.) Bernh. (*I. capensis* Benth; *I. riparia* Raf.).

Near vlei behind homestead; flowers white, 217.

5. *Ramphicarpa tubulosa* (Linn. f.) Benth.

In grassy patches on slope of mountain, 233.

6. *Striga gesnerioides* (Willd.) Vatke (*S. orobanchoides* Benth.).

Growing under cover of and parasitic on the roots of *Euphorbia Cooperi*, east of homestead, 127.

164. BIGNONIACEAE.

1. *Rhigozum obovatum* Burch.

Frequent in *Catophractes* belt; flowers yellow, 53.

R. zambesiacum Bak.

Between Waterpoort and Wylie's Poort, 340.

2. *Catophractes Alexandri* Don.

Dominant in a belt north of pan and owing to this the term "*Catophractes* belt" is spoken of in this paper, 514, 58.

165. PEDALIACEAE.

1. *Pterodiscus ngamicus* N. E. Br.

Along sandy western margin of pan, 427. (A poor plant of what might be another species of *Pterodiscus* was observed).

2. *Harpagophytum Zeyheri* Decne ?

In sandy soil, west of pan, 689. The specimen is not in fruit and hence it is impossible to name it specifically.

3. *Sesamothamnus Lugardii* N. E. Br.

Frequent in very sandy area, north of pan, 59. Comparison of our specimen with fruiting material from South West Africa named *S. Seineri* Engl. in Herb. Hort. Bot. Berol (see Engl. and Drude, Veg. der Erde, 9, I, 2, p. 586 and tab. 28, 2 (1910)] suggests that these two species are the same. Flowering material of *S. Seineri* is necessary to decide this question. In any case *S. Lugardii* (1906) has priority.

3. *Sesamum capense* Burm.

East of pan, occasional, 557.

4. *Ceratotheca triloba* E. Mey.

Very frequent at foot of mountain below upper vlei, 583.

5. *Pretraea zanguebarica* Gay

Along south-eastern margin of pan, frequent in patches, 690.

169. LENTIBULARIACEAE.

1. *Utricularia exoleta* R. Br.

Plentiful, but scattered in vlei behind homestead, 209.

170. ACANTHACEAE.

1. *Dyschoriste Fischeri* Lindau

Shrub, up to 1 metre high, between Waterpoort and Wylie's Poort, 333.

2. *Ruellia patula* Jacq.

Margin of pan, under cover of small *Acacia*; flowers white, 28, 467: between Zoutpan and Waterpoort, in shade of shrubs, 250.

3. *Barleria Bremekampi* Obermeyer

Very spiny bush, up to 1 metre high, in kloof behind homestead, 124.

B. elegans S. Moore

Foot of mountain, near *Euphorbia Cooperi*, 130.

B. Galpinii C. B. Cl.

In kloof behind homestead, 123.

B. heterotricha Lindau

In kloof behind homestead, 125.

B. obtusa Nees

On northern slopes of mountain, 162.

B. transvaalensis Obermeyer

In *Acacia* belt, north of pan, near *Sesamothamnus*, 50.

4. *Neuracanthus africanus* T. Anders. ex Sp. Moore

Between Zoutpan and Waterpoort, fairly frequent among *Acacia* scrub, 251.

5. *Blepharis Clarkei* Schinz

South-eastern side of pan, in stony surroundings, 291.

B. diversispina (Nees) C. B. Cl.

Farm Zoutpan, 251a.

6. *Asystasia atriplicifolia* Bremekamp

On farm "Eyem" near large baobab, on north-eastern boundary, 89.

7. **Ruspolia eryocrateriformis** (Vahl.) Milne-Redhead var. **australis** Milne-Redhead
Wylie's Poort; shrub, with arching branches, 10 ft. long, hanging over stones; flowers scarlet; fruit green, turning black, 441.
8. **Dictyoptera clinopodia** Nees
Under *Acacia*, near eastern margin of pan, 297.
9. **Justicia flava** Vahl.
Western margin of pan, in gravelly soil; flowers yellow; stems procumbent, 21.
- J. odora** Vahl.
Frequent in *Catophractes* belt, up to 60 cm. high, 190.
- J. (Calophanoides) sp.**
On ledge above kloof, behind homestead, 610.
- J. (Ansellia) sp.**
Above bushman cave on upper slopes of mountain, 168.

173. RUBIACEAE.

1. **Oldenlandia cephalotes** (Hochst.) O. Kuntze (*O. sphaerocephala* Schinz).
In vlei behind homestead, 201.
[Comparison of the types of *O. cephalotes* and *O. sphaerocephala* has convinced me that they represent one species. The leaves are somewhat variable in shape and size as is very often the case in species of *Oldenlandia* (H.G.S.).]
- O. decumbens** (Hochst.) Hiern
In shady forest patches at foot of mountain, 592.
2. **Randia sp.** near *R. rudis* E. Mey.
Foot of hill, below a group of *Euphorbia Cooperi*, 128.
3. **Gardenia Neuberia** E. and Z.
Small tree, among rocks at roadside in Wylie's Poort, 667.
- G. spatulifolia** Stapf and Hutch.
Occasional on northern slopes of mountain; tree, about 5 metres high, 158.
4. **Empogona Kirkii** Hook. f. var. **australis** Schweickhardt var. nov. *A typo foliis multo maioribus glabrisque, pedicellis ovario et calyce multo minus pubescentibus differt.*
In *Lonchocarpus* belt, 72 (type); on lower northern slopes of mountain behind homestead; flowers white, densely bearded in the throat, 528.
[No 72 was collected during November, i.e. early summer and therefore shows the presence of well-developed young leaves which are of a thin texture. In shape and size those agree with leaves of 528 collected during April, which, however, are leathery in texture and somewhat shiny on the upper surface. Indumentum of branches, pedicels, ovary and calyx-lobes are similar in both gatherings (H.G.S.).]
5. **Vanguera tomentosa** Hochst.
On northern slopes of mountain, 691.
- V. cyanescens** Robyns
On northern slopes of mountain, 102.
[Apart from the fact that *Dinter* 58 (type of *V. cyanescens*) has turned partly black on drying (indigo?), there appears to be no difference between this species and *V. floribunda* Robyns. *Rogers* 18214 (type of the latter) is a fairly robust specimen which is slightly more hairy in the inflorescence than our gathering. A wider range of material will probably prove the above-mentioned species to be identical (H.G.S.).]

6. *Canthium ventosa* (L.) Sp. Moore

Farm "Elsteg," about 6 miles west of Louis Trichardt, 359.

C. huillense Hiern

Northern slopes of mountain, 173: in kloof behind homestead, 122.

7. *Pavetta Harborii* Sp. Moore

Between Zoutpan and Waterpoort, locally abundant, 255.

P. Schumanniana F. Hoffm. ex K. Schum.

Farm "Elsteg," about 6 miles west of Louis Trichardt, 357.

8. *Plectroniella armata* (K. Schum.) Robyns

In *Lonchocarpus* belt, west of homestead; tree, 5-6 metres high; flowers bearded in throat, 26.

9. *Anthospermum lanceolatum* Thunb.

Farm "Elsteg," about 6 miles west of Louis Trichardt, 362. This gathering is somewhat more pubescent than the typical plant.

176. CUCURBITACEAE.

1. *Corallocarpus sphaerocarpus* var. *scaberrimus* Cogn.

On very margin of pan, climbing in *Acacia*, 30.

2. *Momordica Balsamina* L.

Climbing in and over small *Acacia* in *Lonchocarpus* belt, 14.

3. *Citrullus naudinianus* (Sond.) Hook. f.

Frequent in very sandy area, about 3 miles west of pan, known locally as "gembok-komkommer," 646.

C. vulgaris Schrad.

Margin of pan, not very frequent, 455.

4. *Cucumis africanus* L. f. var. *Zeyheri* Burtt Davy

In drier parts of vlei behind homestead, 213.

C. hirsutus Sond.

Farm "Gaanspan," north of Blaauwberg, 245: between Zoutpan and Waterpoort, 258: farm "Eyem," north of Blaauwberg, 85. Reported to be a medicinal plant.

C. myriocarpus Naud.

Along roadside, between Louis Trichardt and Pietersburg, 448.

5. *Coccinia Rehmannii* Cogn.

Climbing in *Salvadora*, *Lonchocarpus* belt, 40.

C. sessilifolia (Sond.) Cogn.

Farm "Eyem," north of Blaauwberg, 91.

177. CAMPANULACEAE.

1. *Lobelia decipiens* Sond.

In vlei behind homestead, fairly common, 214.

179. COMPOSITAE.

1. *Vernonia amygdalina* Del. (*V. Randii* Sp. Moore).

Along watercourse leading from kloof behind homestead; about 6-7 metres high, lounging, 116.

V. cinerascens Sch. Bip. (*V. Luederitziana* O. Hoffm.).

Between Zoutpan and Waterpoort: shrub, 60-100 cm. high, growing in exposed sandy soil, 249. First record of this species for the Transvaal.

[This plant has a wide distribution in Africa, occurring in Eritrea, Somaliland, Angola, Great Namaqualand and N. Transvaal. *V. Luederitziana* undoubtedly belongs to the same species. Our gathering differs from the Abyssinian plant only in having more robust and shorter peduncles (H.G.S.).]

V. fastigiata O. and H.

In low thorny scrub near *Catophractes* belt, 516.

2. *Ageratum conyzoides* L.

Along stream leading from large vlei, west of homestead, 227.

3. *Eupatorium africanum* O. and H.

Farm "Elsteg," about 6 miles west of Louis Trichardt, 342a.

4. *Aster luteus* (N. E. Br.) Hutch. forma.

Between Zoutpan and Waterpoort, frequent in sandy soil, 256: Vivo, in sandy soil 656.

Our specimens are very similar to the typical form of *A. luteus* from northern Natal, differing from it in having blue ray-florets and slightly more pubescent achenes. The capitula of the Natal plants appear to be generally somewhat smaller. The wide range of material at the Transvaal Museum, however, seems to indicate that our specimens are merely forms of a variable species.

5. *Psiadia arabica* Jaub. and Spach.

Between Waterpoort and Yylie's Poort, 334.

6. *Nidorella resedifolia* DC.

In shade of trees near margin of pan, 495: between Zoutpan and Waterpoort, 272.

7. *Brachylaena* sp., probably *B. transvaalensis* Phill. and Schw.

Farm "Elsteg," about 6 miles west of Louis Trichardt, 349.

8. *Blumea caffra* (DC.) O. Hoffm. (*B. natalensis* Sch. Bip.).

In open soil east of pan; heads globose; florets pinkish, 550.

B. lacera DC.

Farm "Elsteg," about 6 miles west of Louis Trichardt, 205.

9. *Pluchea leubnitziae* (O. Hoffm.) N. E. Br. (*Pechuelloeschea Leubnitziae* Hoffm.).

In *Catophractes* belt, north of pan, 55.

10. *Epaltes alata* Steetz.

In shade of trees near margin of pan, 501; north-east of pan, in grassland, 301.

11. *Helichrysum Kraussi* Sch. Bip.

Farm "Elsteg," about 6 miles west of Louis Trichardt, 345.

12. *Pegolettia senegalensis* Cass.

In open soil between stones near margin of pan, 502.

13. **Geigeria aspera** Harv. forma ?

Vivo, frequent in sandy soil, 651 : in sandy soil near *Catophractes* belt, 507 : between Zoutpan and Waterpoort, 273.

14. **Senecio polyanthemoides** Sch. Bip.

Scattered, in vlei behind homestead, 203.

S. transvaalensis Bolus

Between Louis Trichardt and Pietersburg ; flowers pink, 674.

15. **Kleinia longiflora** DC.

East of pan among species of *Acacia*, 537.

16. **Berkheyopsis bechuanensis** Sp. Moore

Fairly frequent in very sandy area, about 3 miles west of pan, 638.

THE GENUS *ELYONURUS* Humb. and Bonpl. IN SOUTH AFRICA.

By E. P. PHILLIPS, M.A., D.Sc. and H. C. BREDELL, M.Sc.

SYSTEMATIC (By E. P. PHILLIPS).

THE genus *Elyonurus* is known by about twelve species recorded from South and North America, America, Australia, Arabia, Persia and Africa. In the year 1841 Nees described two species (*E. argenteus* and *E. thimodorus*) from the eastern and north-eastern districts of the Cape Province. Stapf in the "Flora Capensis" recognised only one species and reduced the second species to a variety *thymiodora*.

I recently had occasion to examine some fresh specimens collected near Pretoria and which did not conform to the description in the "Flora Capensis." As I suspected it to be different from the plant named *E. argenteus*, an examination of all the material in the National Herbarium was undertaken. The result of that examination is that I recognise three species as occurring in South Africa. The species *E. argenteus* Nees is common in the eastern and north-eastern areas of the Union; the plant typical of the western Transvaal and previously referred to *E. argenteus*, has been named *E. glaber*. It is characterised by the glabrous leaf-sheaths but a form with villous leaf-sheaths is met with and has been designated var. *villosus*. The third species (*E. pretoriensis*) I have only seen from Pretoria; it is characterised by having a *palea* present and the peduncled spikelet invariably bisexual.

Mr. C. E. Hubbard of the Kew Herbarium, to whom some specimens were referred, is not very convinced that the specimens are specifically distinct and due consideration has been given to his views. The distribution of the species as recognised in this paper is distinct; certain morphological characters are constant; the leaf-anatomy as detailed by Mr. Bredell is distinct. For the above reasons there appears every justification for separating the South African plants of *Elyonurus* into three species.

I am indebted to the director of the Royal Botanic Gardens, Kew, for sending me on loan, three herbarium sheets from the Kew Herbarium and to Mr. C. E. Hubbard for comments he made on specimens sent to him.

KEY TO SPECIES.

1. Pale, present in both spikelets as a hyaline scale; peduncled spikelet invariably bisexual..... 3. *pretoriensis*.
- Pale, absent in both spikelets, very rarely present; peduncled spikelets, male..... 2.
2. Sessile and peduncled spikelets of equal lengths; lower glume of sessile spikelet less than 1 cm. long, 2-toothed or with awns 1-2.25 mm. long, rarely longer..... 1. *argenteus*.
- Sessile spikelet longer than the peduncled spikelet; lower sessile glume of spikelet 1 cm. or more long, rarely shorter, with awns 4-6.5 cm. long, rarely shorter..... 3. *glaber*.

1. *E. argenteus* Nees

Plants 25–100 cm. high, forming dense clumps. Basal leaf-sheaths persistent, somewhat villous. *Blades* green, 10–27 cm. long, 0·5 mm. broad, usually somewhat curled, keeled so that leaf is almost 3-angled in cross-section, ciliate below, glabrous. *Culm* bearing inflorescence 2-noded, hairy at nodes. *Inflorescence* 3–8 cm. long. *Spikelets* of equal lengths. **SESSILE SPIKELET.**—*Lower glume* 5·5–9·5 mm. long, 1·5–2 mm. broad, usually lanceolate, rarely ovate-lanceolate, acuminate, usually 2-toothed, more rarely produced into short awns 1–2·25 mm. long, with a dark band round the margins, with the margins narrowly inflexed and narrowly keeled, long ciliate on the keels, sometimes cilia from tubercles, usually 9-nerved, more rarely 5–7-nerved, villous on the back. *Upper glume* 4·5–7 mm. long, 1–1·5 mm. broad, lanceolate, acute, deeply concave, 3-nerved, keeled on back, shortly ciliate, pubescent on the back. *Lower valve* 3–5 mm. long, 0·75 mm. broad, lanceolate, acute, flattish on the back, 2-nerved, very rarely 3-nerved, ciliate above on hyaline marginal flaps. *Upper valve* 3–5 mm. long, 0·75 mm. broad, lanceolate, concave, 3-nerved, ciliate on hyaline marginal flaps. *Anthers* 3·5 mm. long, linear. *Ovary* ellipsoid; styles free; stigmas about twice as long as styles. *Lodicules* fan-shaped or triangular, truncate. **PEDUNCLED SPIKELET.**—*Peduncle* 2·5–4 mm. long, hollow, obtusely 3-angled, villous. *Lower glume* 3·5–7 mm. long, 1–1·75 mm. broad, lanceolate, long acuminate, sub-acuminate, 2-awned, 2-toothed, or with a small lateral tooth, with one margin narrowly inflexed and narrowly keeled, 5–7-nerved, more rarely 8–9-nerved, ciliate on the keel, with the cilia sometimes from tubercles, pilose or villous on the back. *Upper glume* 3·5–6·5 mm. long, 0·75–1·25 mm. broad, lanceolate, acute or sub-acute, deeply concave, rounded on the back, usually 3-nerved, rarely 4- or 7-nerved, keeled, ciliate on hyaline marginal flaps, usually shortly ciliate on keel, pubescent or shortly pilose on back, rarely glabrous. *Lower valve* 2·5–4 mm. long, 0·75–1·25 mm. broad, lanceolate, flattish on the back, 2-nerved, very rarely 3-nerved, ciliate on hyaline marginal flaps. *Upper valve* 3·5–4 mm. long, rarely shorter, 0·5–1 mm. broad, lanceolate, deeply concave, rounded on back, 3-nerved, ciliate on marginal hyaline flaps. *Pale*, a hyaline fimbriated scale (see only in one specimen). *Lodicules* fan-shaped or triangular, truncate. *E. thimiodorus* Nees, *Fl. Afr. Austr.*, 95; *E. argenteus* var. *thymiodora* Stapf in *Fl. Cap.*, vol. 7, p. 333; *E. argenteus* Nees ex *Fl. Cap.* l.c. partly.

CAPE PROVINCE.—Humansdorp distr.: Witte Elsbosch, 750 ft., April, *Fourcade*, 2542. Albany distr.: Grahamstown, Oct., *Daly* and *Sole*, 108; Howison's Poort, 2,200 ft., Dec., *Galpin*, 3094; Trapp's Valley, Dec., *Daly*, 714. Kingwilliamstown distr.: Amatola Mountain, 4,000 ft., Dec., *Dyer*, 260; Kei Road, 2,000 ft., Febr., *Ranger*, 50. Stutterheim distr.: Blaney Junction, 1,200 ft., Jan., *Galpin*, 5622. Stockenström distr.: Katberg, Dec., *Sole*, 405. Queenstown distr.: Effingham Peak, Katberg, 5,700 ft., Dec., *Galpin*, 8393; Roode Rand farm, 3,550 ft., Nov., *Galpin*, 2510; Hangklip Mountain, 5,400 ft., Febr., *Galpin*, 5859. Komgha distr.: Near Komgha, 2,000 ft., Sept., *Flanagan*, 897. Kentani distr.: Near Kentani, 1,200 ft., Nov., *Pegler*, 1386. Tsolo distr.: Idutywa, 2,500 ft., Jan., *Schltr.*, 6273; Bazeia, *Baur*, 284. Barkly East distr.: Near Barkly East, Febr., *Greyvenstein*, 12. Mount Currie distr.: Hills round Kokstad, Nov., *Goossens*, 222; *Mogg*, 4826.

ORANGE FREE STATE.—Ficksburg distr.: Riverhill Farm, high up on mountain slopes, Jan., *Potts* in *Grey Univ. Herb.*, 3706, 3721. Senekal distr.: Common on upper slopes of mountains near Doornkop, 5,300 ft., Dec., *Goossens*, 709; lava soil on top of mountain at Wonderkop, Dec., *Goossens*, 825.

BASUTOLAND.—Drakensbergen, *Stokoe* in *Nat. Herb.*, 8342; Thabuing, Jan., *Watt* and *Brandwyk* in *Nat. Herb.*, 8763; Leribe, *Dieterlen*, 177.

NATAL.—Pietermaritzburg distr.: Cedara, Dec., *Phillips* in *Nat. Herb.*, 20570. Lion's River distr.: St. Ives, Oct., *Mogg*, 5661; Balgowan, Nov., *Mogg*, 3541; near Howick, 3,600 ft., Nov., *Mogg*, 3502. Impendhle distr.: Giant's Castle, 8,000–9,000 ft., Oct.,

Wood, 10543. Estcourt distr.: Mont-aux-Sources, 10,000 ft., Feb., *Bayer and McClean*, 318; Dec., *Schweickerdt in Nat. Herb.*, 20573; Mooi River, Oct., *Mogg*, 3063, 3277. Bergville distr.: Mt. Twinta, Jan., *Doidge in Nat. Herb.*, 20571; Acton Homes, Jan., *Doidge in Nat. Herb.*, 20572.

TRANSVAAL.—Heidelberg distr.: Heidelberg, Dec., *Burt Davy*, 3147. Standerton distr.: Near Standerton, Jan., *Burt Davy*, 3083. Ermelo distr.: Near Ermelo, Jan., *Burt Davy*, 952; Febr., *Henrici*, 1209. Carolina distr.: Vlei on town lands near Carolina, Jan., *Pellissier in Grey Univ. Coll. Herb.*, 4609; Dec., *Burt Davy in Gert. Herb.*, 7364. Middelburg distr.: Botsabelo, Dec., *Fouche in Nat. Herb.*, 20574.

SWAZILAND.—Near Bremersdorp, *Burt Davy*, 3048.

A specimen (*Rehmann*, 5672) collected at Houtbosch, in the Pietersburg district of the Transvaal is probably this species but the material is too poor for any examination.

2. *E. glaber* Phillips sp. nov. *Affinis E. argenteus sed foliis basin versus glaber differt. E. argenteus Nees ex Fl. Cap.*, vol. 7, p. 332 partly.

Culmi 42–70 cm. alti. *Folia* 15–36 cm. longa, 2–3 mm. lata, carinata, basin versus glabra. *Racemi* 7–14 cm. longi, *Spiculae* sessiles hermaphroditae. 1–1.4 cm. longae. *Gluma* inferior, lanceolata, 6–8-nervata, profunde 2-fida, dense villosa. *Spiculae* pedunculatae 0.65–1 cm. longae. *Pedunculus* 2.5–4 cm. longus, villosus. *Gluma* inferior 6–9.5 mm. longa, lanceolata, acuminata vel profunde 2-fida, pilosa vel villosa.

BASUTOLAND.—Likhoel, March, *Dieterlen*, 1097.

ORANGE FREE STATE.—Draaifontein (no precise locality), *Rehmann*, 3658. Senekal distr.: Near Senekal, Dec., *Goossens*, 956. Heilbron distr.: Heilbron, Jan., *Goossens*, 444. Hoopstad distr.: Wesselsbron, Jan., *Goossens*, 1243. Kroonstad distr.: Kroonstad, Sept., *Pont*, 498.

CAPE PROVINCE.—Vryburg distr.: Armoed's Vlake, Febr., *Viljoen in Nat. Herb.*, 77; *Theiler in Nat. Herb.*, 20675; Klipvlakte, Nov., *Burt Davy*, 11131.

TRANSVAAL.—Marico distr.: Derby Station, Nov., *Burt Davy in Gort. Herb.*, 7168. Bloemhof distr.: Kameelpan, near Christiana, Jan., *Theron*, 628; Christiana, Mch., *Burt Davy in Gort. Herb.*, 14126; Caywood's Hope, Mch., *Burt Davy*, 12953. Wolmaransstad distr.: Boskuil, May, *Sutton*, 114. Ventersdorp distr.: Ventersdorp, Mch., *Pole Evans*, 3139. Potchefstroom distr.: Welverdiend Station, Mch., *Burt Davy*, 14569. Johannesburg distr.: Turfontein, Mch., *Bryant*, D. 48; Johannesburg, July, *Hitchcock*, 24141. Pretoria distr.: Near Pretoria, Febr., *Skea*, 3, 71; *Liebenberg*, 3241 (typus), 3211; *Mogg in Nat. Herb.*, 20577; Onderstepoort, *Du Toit*, 28. Waterberg distr.: Springbok Flats, Oct., *Burt Davy*, 7067.

Var. *villosus* Phillips, *Folia* basin versus pilosa vel villosa.

ORANGE FREE STATE.—Bothaville distr.: Bothaville, Jan., *Goossens*, 1182.

CAPE PROVINCE.—Kuruman distr.: Near Kuruman, Dec., *J. W. Mogg*, 7627.

TRANSVAAL.—Bloemhof distr.: Near Christiana, *Nelson*, 65. Vereeniging distr.: "Weltevrede," Dec., *Cronje*, 55. Johannesburg distr.: Johannesburg, *Moss*, 6852, (a hyaline pale was found in *Moss*, 6852); Elsburg, Jan., *Rogers*, 12135. Benoni distr.: Benoni, Sept., *Bradfield*, T.187. Pretoria distr.: Premier Mine, Oct., *Moss*, 5451; near Pretoria, Dec., *MacDonald in Gort. Herb.*, 5441; Hartebeestnek, Nov., *Burt Davy*, 758; Wonderboom, near Pretoria, *Rehmann*, 4491.

Plants 42–70 cm. high, forming dense tufts; new shoots from nodes on a very short rhizome. Basal leaf-sheaths persistent, reddish, glabrous. Blades bright or dark green,

15–36 cm. long, 2–3 mm. broad (when fresh), keeled on back, with 5–6 nerves on either side of the mid-rib, ciliate at juncture with the sheath, otherwise glabrous. *Ligule* a narrow lacerated rim, about 0·5 mm. broad. *Culms* simple, rarely branched, 2–5-noded, with the nodes reddish and slightly swollen; upper internode 15–26 cm. long. *Inflorescence* 7–14 cm. long. *Sessile spikelet* longer than the peduncled spikelet, very rarely as long. **SESSILE SPIKELET.**—*Lower glume* 1–1·4 cm. long, rarely less than 1 cm. long, 0·15–0·175 cm. broad, lanceolate, usually acuminate, produced into two ciliate awns 4–6·5 mm. long, rarely shorter than 4 mm., with the margins narrowly inflexed, narrowly keeled and long ciliate on the keels, 6–8-nerved, villous on the back. *Upper glume* 5·5–7·5 mm. long, 0·1–0·125 cm. broad, lanceolate, usually subacuminate, acute, deeply concave, 3-nerved, keeled on the back, pilose, more rarely pubescent on the back. *Lower valve* 5–6 mm. long, 0·75–1·25 mm. broad, lanceolate, flattish on the back, 2-nerved, ciliate above on hyaline marginal flaps. *Upper valve* 4–4·75 mm. long, 0·75–1 mm. broad, lanceolate, concave, rounded on the back, 3-nerved, ciliate above on hyaline marginal flaps. *Anthers* 2·5–3·5 mm. long, linear. *Ovary* ellipsoid; styles free; stigmas twice as long as the styles. *Lodicules* fan-shaped or triangular, truncate, somewhat fleshy. **PEDUNCLED SPIKELET.**—*Peduncle* 2·5–4 mm. long, hollow, villous. *Lower glume* 6–9·5 mm. long, 1–1·25 mm. broad, lanceolate, usually long acuminate, rarely 2-awned and then awns 1·5–3·5 mm. long, with one margin narrowly inflexed and narrowly keeled on same margin, rarely both margins narrowly keeled, 5-nerved, rarely 6-nerved, ciliate on the keel, pilose or villous on the back. *Upper glume* 5–8 mm. long, 0·75–1 mm. broad, lanceolate, acuminate, more rarely awned, concave, rounded on the back, 3-nerved, ciliate on hyaline marginal flaps, sparsely pilose on the back or pubescent with a few long hairs. *Lower valve* 5–6·5 mm. long, 0·75–1·25 mm. broad, lanceolate or linear-lanceolate, usually flattish on the back, more rarely slightly concave, 2-nerved, ciliate on hyaline marginal flaps. *Upper valve* 3·5–5 mm. long, 0·5–1 mm. broad, lanceolate, concave, rounded on back, 3-nerved, ciliate on upper margins. *Anthers* 2·75–3·5 mm. long, linear. *Lodicules* triangular or fan-shaped, truncate, somewhat fleshy. **Var. villosa.** Leaf sheaths pilose or villous.

3. ***E. pretoriensis*** Phillips sp. nov. Affinis *E. argenteus* sed spiculus pedunculatis hermaphroditis differt.

Culmi ad 42 cm. alti. *Folia* ad 19 cm. longa, 3·5–4 mm. lata, carinata, basin versus ciliata, villosa; ligulae ad marginem breviter dense ciliatam redactae. *Racemi* 7·5–9·5 cm. longi. *Spiculae* sessiles hermaphroditae, 1·05–1·25 cm. longae. *Gluma* inferior, lanceolata, 6–9-nervata, profunde 2-fida, dense villosa. *Spiculae* pedunculatae hermaphroditae, 0·65–1 cm. longae. *Gluma* inferior, lanceolata, 5–9-nervata, acuminata, pilosa vel villosa. *Pedunculus* 1–3·5 mm. longus, villosus.

TRANSVAAL.—Pretoria distr.: Meintjes Kop, Pretoria, Oct., *Lansdell in Govt. Herb.*, 16066; near Pretoria, *Burt Davy*, 726; Brooklyn, near Pretoria, *Mogg*, 12276; Zoo grounds, Pretoria, *Mogg in Nat. Herb.*, 20576 (typus).

Plants up to 42 cm. high, forming dense clumps. New shoots arising from nodes on a short rhizome with very short internodes. Basal leaf-sheaths persistent, slightly flushed with pink, keeled, ciliate, densely villous. *Blades* glaucous green, up to 19 cm. long, 3·5–4 mm. broad (when fresh), distinctly keeled on the back, with about 8 lateral nerves on either side of the mid-rib, ciliate on the basal portion, otherwise glabrous. *Ligule* a very narrow membranous rim, about 0·5 mm. broad, minutely lacerated. Culm bearing inflorescence 2-noded, rarely branched; nodes reddish, somewhat unequally swollen; upper internode 13–16 cm. long, glabrous. *Inflorescence* 7·5–9·5 cm. long. *Peduncled and sessile spikelets* of equal lengths or one or the other slightly longer. **SESSILE SPIKELET.**—*Lower glume* 1·05–1·25 cm. long, 0·175–0·225 cm. broad, lanceolate, more rarely ovate-lanceolate, produced into 2 awns 3·5–6·5 mm. long, with the margins narrowly inflexed, narrowly keeled, ciliate on the keels, usually densely villous, more rarely pilose on the back. *Upper glume* 6·5–7 mm. long, 1·25–2·25 mm. broad, lanceolate, acute, deeply concave, 3-nerved,

keeled on back, shortly ciliate on hyaline marginal flaps, shortly pilose on the back, more rarely pubescent. *Lower valve* 5-6 mm. long, 1.25 mm. broad, lanceolate, acute, flattish on the back, 2-nerved, shortly ciliate on hyaline marginal flaps. *Upper valve* 4-5 mm. long, 1 mm. broad, lanceolate, concave, rounded on the back, 3-5-nerved, minutely ciliate on hyaline marginal flaps. *Pale* a hyaline fimbriated or ciliated scale 0.5-1 mm. long. *Anthers* 3 mm. long, linear. *Ovary* ellipsoid; styles free; stigmas twice as long as the styles. *Lodicules* fan-shaped or quadrate, truncate above. **PEDUNCLED SPIKELET.**—*Peduncle* 1-3.5 mm. long, hollow, villous. *Lower glume* 0.65-1 cm. long, 1.25-1.75 mm. broad, lanceolate, long acuminate, sometimes with a minute lateral tooth, with one margin narrowly inflexed and keeled, 5-9-nerved, long ciliate on keel, pilose or villous on back. *Upper glume* 5-6.5 mm. long, 1-1.25 mm. broad, lanceolate, acute or sub-acute, deeply concave, rounded on the back, 3-nerved, ciliate on hyaline marginal flaps, sparsely pubescent or shortly pilose on the back. *Lower valve* 2.5-5.5 mm. long, 1 mm. broad, lanceolate, deeply concave, flattish on the back, 2-nerved, ciliate from hyaline marginal flaps. *Upper valve* 2-5 mm. long, 1 mm. broad, lanceolate, acute, concave, rounded on back, 3-nerved, ciliate on hyaline marginal flaps. *Pale* 0.5-1 mm. long, a hyaline ciliated or fimbriated scale. *Ovary* ellipsoid; styles free; stigmas twice as long as the styles. *Stamens* 2.25-3.5 mm. long, linear. *Lodicules* fan-shaped, truncate.



Distribution of *E. glaber* Phill. and *E. argenteus* Nees.

ANATOMICAL (By H. C. BREDELL).

An examination of the anatomy of certain specimens was undertaken in order to find out whether anatomical characters would support the taxonomic characters on which the genus was divided into three species. The specimens examined were *Galpin*, 3094 (*E. argenteus* Nees); *Mogg in National Herbarium*, 20576 (*E. pretoriensis* Phill.); and *Mogg in National Herbarium*, 20577 (*E. glaber* Phill.). Only the leaf and root anatomy of these grasses were examined.

E. PRETORIENSIS Phill.**LEAF SURFACE** (Fig. 1).

The structure and arrangement of the epidermal cells can be studied when parts of the epidermis are torn from the underlying tissues and placed in water under the microscope. The abaxial or dorsal epidermis consists of long cells with intervening short cells opposite the parenchymatous tissues of the leaf. Opposite the primary and secondary veins, the cells differ in being more thick-walled, narrower, and of three types: (1) short rod-like cells; (2) medium-sized cells with the side walls constricted at the middle; and (3) elongated cells. The walls of all the long cells are undulated. On the adaxial or ventral surface only two types of cells can be distinguished, namely more or less elongated cells and short cells, the latter only being present opposite the primary and secondary vascular bundles. The cells on the adaxial surface are always shorter than corresponding cells on the abaxial surface, and the cell walls are only slightly or not at all undulated. On the abaxial surface the stomata develop in four rows, two near each leaf margin but on the adaxial surface they are distributed in two or more rows between the veins over the entire surface.

LEAF ANATOMY (Fig. II).

In cross section the following tissues of the leaf can be distinguished: (a) the abaxial epidermis of closely packed regular cells with thickened outer tangential walls and which are usually small and much lignified opposite the mid-rib, the primary, and secondary veins; (b) the adaxial epidermis of regular, relatively thin-walled cells between which many stomata can be seen in cross section. The row of epidermal cells underlying the mid-rib are usually bigger and more thin-walled than the rest and act as motor cells, whereas those opposite the primary veins are smaller and thick-walled; (c) the ground tissue made up of thin-walled cells and in which lie (d), the vascular bundles. According to the extent of development, three types of vascular bundles can be distinguished, viz. the primary, secondary and tertiary bundles. The structure of the bundles is uniform throughout. All the primary bundles, except the mid-rib, have a sclerenchymatous tissue (sterome) developed towards the adaxial and abaxial surface. The secondary bundles are provided with an abaxial sterome only, whereas the tertiary bundles have no sterome associated with them. The sterome strands are very strongly developed and give the leaf a hard texture. The number of bundles usually averages 32, but in very broad-leaved specimens as many as 40 were found. Two or three tertiary bundles are present between the mid-rib and the first secondary bundles and 5-7 bundles between the mid-rib and first primary bundle.

ROOT ANATOMY (Fig. III).

In cross section the following tissues can be distinguished: One layer of irregular more or less dome-shaped epiblem cells some of which grow out to form root hairs. Those cells usually disintegrate as soon as the root hairs die off only leaving remnants of some of

the cell walls in their place. Underlying the epiblem is the exodermis, which consists of one layer of more or less elongated cells with a marked tertiary thickening on the outer tangential walls. Underlying the exodermis are two or more rows of thick-walled cells which form a definite mechanical tissue, the sclerenchyma. The sclerenchyma surrounds and protects the inner thin-walled cortical layers (cortex). Adjoining the cortex on the inside is a single layer of well-differentiated cells, the endodermis which have a marked tertiary thickening on the inner tangential walls. Inside the endodermis are the vascular bundles with big vessels in the xylem and in the centre is the pith made up of thin-walled cells.

E. ARGENTEUS Nees

LEAF SURFACE (Fig. IV).

The structure and arrangement of the cells of the abaxial epidermis resemble that of *E. pretoriensis* (Fig. I). On the adaxial surface the cells are irregular in outline and some of them bulge out to form an outgrowth on the outer tangential wall. Many hairs develop from this surface from between the relatively thin-walled cells.

LEAF ANATOMY (Fig. V).

The structure of the leaf is very similar to that of *E. pretoriensis* (Fig. II). Two tertiary bundles are present between the mid-rib and the first secondary bundle and not more than five bundles are present between the mid-rib and the first primary bundle. The number of motor cells varies from 5-14 and the primary bundles are provided with a well-developed stereome which gives the leaf a hard texture.

ROOT ANATOMY.

The structure of the root is the same as described under *E. pretoriensis* (Fig. III) but a sclerenchyma with slightly thick-walled cells is present in old roots only.

E. GLABER Phill.

LEAF SURFACE.

The arrangement of the epidermal cells on both abaxial and adaxial surfaces is similar to that of *E. pretoriensis*. On both surfaces the stomata are arranged in two or more rows between the veins and the cells are extremely thin-walled on the adaxial surface.

LEAF ANATOMY (Fig. VI).

In cross section the same tissues are observed as in *E. pretoriensis* and *E. argenteus*. The cells of the abaxial surface differ from those of the adaxial surface in being more thick-walled on the outer tangential walls. One or two tertiary veins are present between the mid-rib and the first secondary vein and not more than six bundles are found between the mid-rib and the first primary vein. Usually 3 or 4 motor cells are present opposite the mid-rib. The cells of the sclenchymatous tissues are relatively thin-walled, with the exception of those opposite the mid-rib, and the leaf has a soft texture.

ROOT ANATOMY (Fig. VII).

The cortical tissues, viz. epiblem, exodermis and cortex have thin-walled cells and a sclerenchymatous tissue is never differentiated.

Anatomically the three species of this genus differ in many respects. The anatomical differences which were found to be constant in the parts studied, are as follows:—

In *E. pretoriensis* and *E. argenteus* the stomata on the abaxial surface are usually arranged in four rows (two rows near each margin), whereas the stomata are arranged in

many rows between most of the veins in *E. glaber*. In *E. pretoriensis* the cells of the adaxial epidermis are relatively thick-walled; in *E. glaber* extremely thin-walled and irregular; and in *E. argenteus* thin-walled with some bulged out on the outer tangential walls. In *E. pretoriensis* and *E. argenteus* the motor cells seem to be restricted to the region of the epidermis underlying the mid-rib, but it is possible that all the big cells on the entire adaxial surface of *E. glaber* are motor cells because the leaves of this grass have the margins inrolled during hot days.

The space between the motor cells and the mid-rib is filled with parenchymatous tissue which appears to be different. In *E. pretoriensis* a group of cells consisting of two or three rows of cells is present, whereas only one row of cells is present in *E. argenteus* and *E. glaber*.

In *E. glaber* and *E. argenteus* one or two tertiary bundles are found between the mid-rib and the first secondary bundle, whereas the presence of two or three tertiary bundles is a fairly common feature in *E. pretoriensis*.

The structure of the vascular bundles is uniform throughout. The leaf texture in *E. pretoriensis* and *E. argenteus* is much harder than that of *E. glaber* owing to a much better developed stereome in the two former.

In the roots certain differences are apparent in the epiblem, exodermis and sclerenchyma. The epiblem cells of *E. argenteus* and *E. pretoriensis* are usually thick-walled and more or less persistent, whereas this layer is always relatively thin-walled in *E. glaber*. The tertiary thickening of the exodermis cells in *E. argenteus* and *E. pretoriensis* is an outstanding anatomical feature of these species. In *E. pretoriensis* the thickened exodermis is always associated with an adjoining tissue of well-differentiated sclerenchymatous cells and although this tissue may be distinguished from the adjoining tissues in *E. argenteus* in very old roots, it never forms a well-developed mechanical tissue. As a result of this lignification of the epiblem, exodermis, and underlying cortex cells, these cell layers are persistent throughout life and form a protecting sheath round the central cylinder which is always present in *E. argenteus* and *E. pretoriensis*, even though the thin-walled cortical cells may disintegrate. In *E. glaber* the exodermis remains relatively thin-walled throughout life and a well-differentiated sclerenchyma is never formed with the result that the cells of epiblem, exodermis and cortex usually break up at an early stage leaving the central cylinder unprotected or with a few crusts of dead cells round it.

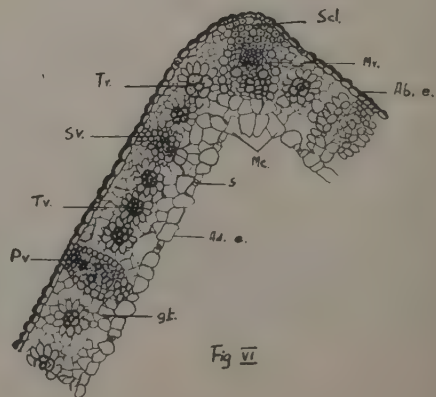
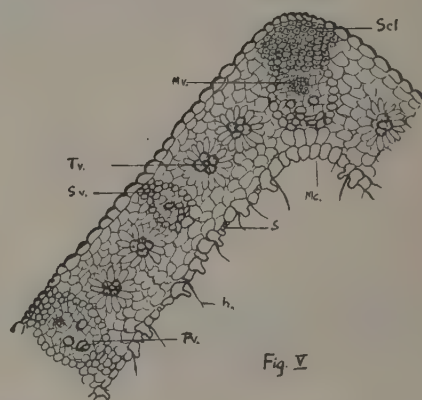
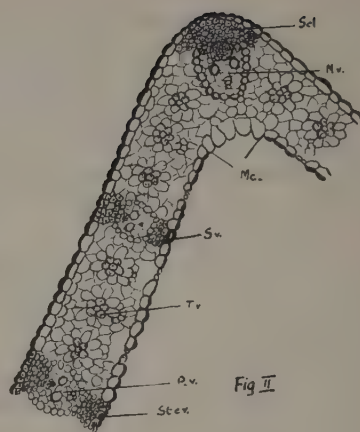
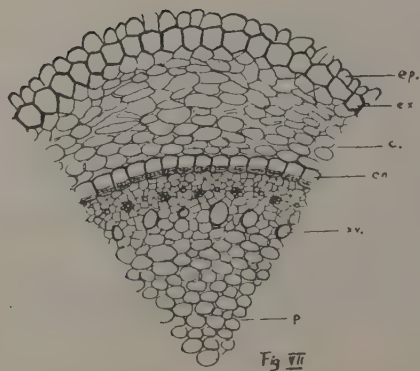
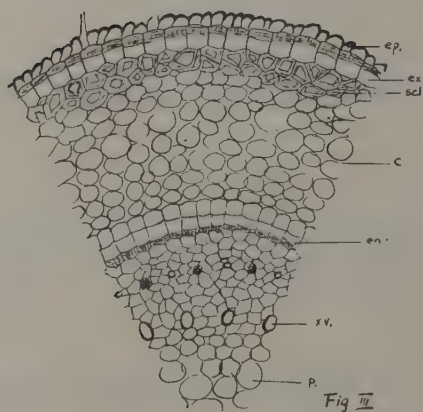
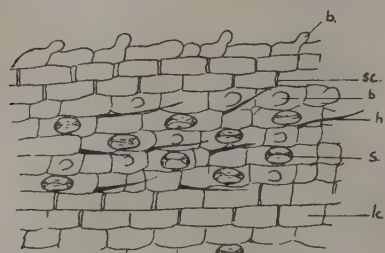
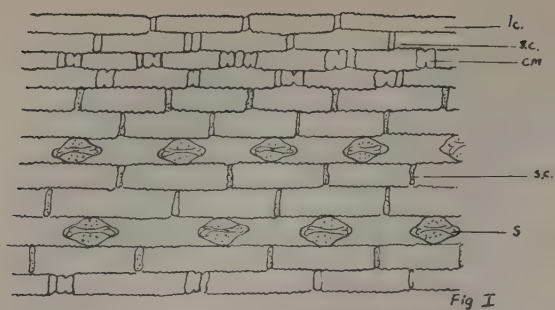
The result of the examination is that the leaf and root anatomy of the South African species of *Elygonurus* may be used to determine the species. While it is probable that slight variations will be found under different environmental conditions, I am of opinion that the main anatomical features will remain constant for each species.

REFERENCE.

Goossens, A. P. and Theron, J. J. (1934): "An Anatomical Study of *Themeda triandra*," S. Afr. Journal Sc., Vol. XXXI.

Key to the species based on the leaf and root anatomy.

- A₁ Leaves with two marginal rows of stomata on abaxial surface, hard in texture; cells of adaxial epidermis relatively thick-walled and more or less regular; roots with a tertiary thickened exodermis:
 - a₁ Sclerenchyma well developed; some of adaxial epidermal cells bulged out..... *E. argenteus*.
 - a₂ Sclerenchyma not very well developed; none of the cells of , adaxial epidermis bulged out..... *E. pretoriensis*.
- A₂ Leaves with many rows of stomata over the abaxial surface; soft in texture; cells of adaxial epidermis extremely thin-walled and irregular; exodermis not tertiary thickened..... *E. glaber*.



EXPLANATION OF FIGURES.

Fig. I: Surface view of abaxial epidermis of *E. pretoriensis*; *Fig. II*: T.S. of leaf of *E. pretoriensis*; *Fig. III*: T.S. of root of *E. pretoriensis*; *Fig. IV*: Surface view of adaxial epidermis of *E. argenteus* Nees; *Fig. V*: T.S. of leaf of *E. argenteus*; *Fig. VI*: T.S. of leaf of *E. glaber*; *Fig. VII*: T.S. of root of *E. glaber*.

Ab. e., abaxial epidermis; *Ad. e.*, adaxial epidermis; *b*, epidermal cell bulged out on the outer tangential wall; *c*, cortex; *cm.*, cell constricted at middle; *en.*, endodermis; *ep.*, epiblem; *ex.*, exodermis; *gt.*, ground tissue; *h.*, hair; *lc.*, long cell; *Mc.*, motor cells; *Mr.*, mid-rib; *p*, pith; *Pv.*, primary vein; *rc.*, rod-like cell; *s.*, stoma; *sc.*, short cell; *Scl.*, sclerenchyma; *ster.*, Sterome; *Sv.*, secondary vein; *Tv.*, tertiary vein.

A QUESTION OF NOMENCLATURE.

By E. P. PHILLIPS, M.A., D.Sc.

I HAD occasion to examine a plant sent in for determination and in the National Herbarium found specimens of a similar plant filed away under three different genera. After looking into the matter I was able to settle the point by reference to literature and the specimens.

1. In 1915 Mrs. L. Bolus described a plant collected by the late Prof. Pearson as *Sutera rigida* L. Bolus (Ann. S.A. Mus., vol. 9, p. 267). She quoted *Pearson*, 3619 as one of the specimens of the species.

2. In 1922 (Hook. Ic. Pl., t. 3007), N. E. Brown described a new genus *Antherothamnus* and named the plants *A. Pearsonii* N. E. Br. *Pearson*, 3619 is one of the quoted specimens.

3. In 1928 (Sukkulantenforschung in Südwest-Afrika, p. 29) K. Dinter mentions a plant *Manuleopsis Karasmontana* Dtr. MS. He also distributed specimens (*Dinter*, 5088) under that name.

Mrs. L. Bolus was good enough to lend me a sheet of *Pearson* 3619 and it was found to be the same plant as *Dinter* 5088. The species must then be:—

Antherothamnus rigida (L. Bolus) N. E. Br. *Sutera rigida* L. Bolus ; *Manuleopsis Karasmontana* *Dinter* nomen nudum.

SOUTH WEST AFRICA.—Great Karasberg : Krai Kluft Ravine, *Pearson*, 8284. Great Namaqualand : Warmbad, *Pearson*, 4377. Bushmanland : Groot Rozynbosch, *Pearson*, 3619. Klein Karas : *Dinter*, 5088.

TRANSVAAL.—Potgietersrust distr. : Farm "Swerwerskraal," about 35 miles west of Potgietersrust, *Rowland in Nat. Herb.*, 8792.

NEWLY DESCRIBED SPECIES.

Crassula sessilicymula Mogg, sp. nov. (Crassulaceae); affinis *C. corymbulosae* Link. petalis erectis, cymulis constanter sessilibus, et foliis cautinis differt.

Herba perennis, 30–75 cm. alta, singulis caulibus ex base rhizomate. *Caules* 0.75 cm. diametro, basi ramosi, fulvi aut colores lateris infra, supra virides glanduloso-pubescentes; internodia 0.5–2.5 cm. longa. *Folia* sub-decussata, sessilia, semi-perfoliata, horizontalia, simplicia; inferiora 2.4 cm. longa, 1 cm. lata, 0.3 cm. crassa, utrunque 3 cm. \times 0.7 cm. \times 0.1 cm. caulis media parte, et ad apice diminuendo, ovata vel lanceolata, acuminata, glabraque non reticulata, glanduloso-ciliata. *Inflorescentia* cymosa. *Cymulae* subcapitatae, numerosae, axillares, ad summum caulis laxae dispositae. *Flores* 2–6, fasciculati, subsessiles. *Calyx* 2 mm. longus; lobi infra breve connati aliquando liberi, 1.5 mm. longi, angusto-acuminati, pilosi, glanduloso-ciliati. *Corolla* alba; petala infra connata, 3 mm. longa, ovato-oblonga, infra ventra concava, apice patentia et infra apicem dorso mucronulata. *Stamina* petalis subaequalia, ad tubum corollae affixa; filamenta subulata, basi lata; antherae ovatae. *Carpella* staminibus aequalia; ovarium oblique-ovatum; stylus distinctus. *Squamae* parvae, aurantiacae, pyriformes, emarginatae.

TRANSVAAL.—Pretoria distr.: Farm "Klipdrift," near Hammanskraal, 28 miles north of Pretoria, in a donga inhabited by thorn-scrub and succulents, Mogg, 12503 (type); between the Saltpan and Hammanskraal, 32 miles N.W. of Pretoria, banks of a dry river-course beneath a bush of *Acacia litakunensis* Burch., Mogg, 12505; farm "Zeekoegat," beneath bush-groups, Mogg, 14091; *Vogts in National Herbarium*, 13049; farm "Rooikop," Smuts and Gillett, 2511. Waterberg distr.: Naboomspruit, farm "Mosdene," under tree clumps in shade, Galpin, M 120 A; Seringa, Galpin, 8479; farm "Gannabosch," Bailey in *Colonial Govt. Herb.*, 80. Potgietersrust distr.: Potgietersrust, farm "Riebeek West," Steyn, 85.

The species is also allied to *C. compacta* Schönl., but the leaves are not all rosulate, and to *C. Lettyae* Phill. from which it differs in the well-developed leaves which subtend the cymules and the glandular-ciliate hairs of the leaf-margins.

Brachystelma nigrum R. A. Dyer, sp. nov. (Asclepiadeae-Ceropegieae); affinis *B. Gerardo* Harv. floribus majoribus calycis lobis superne lineari-lanceolatis corollae indumento coronae interioris lobis brevioribus differt.

Herba perennis. *Caules* erecti, simplex vel non nunquam ramosi, 30–40 cm. alti, 2.5–4 mm. crassi, foliosi, subhispidi, internodiis 3–5 cm. longis apicem versus brevioribus. *Folia* breviter petiolata, late ovata, cordata, obtusa vel subacuta, 2.5–4.5 cm. longa, 2–4 cm. lata, juniora minus, infra prominente nervosa, utrinque pilis paucis induta, nerviis et margine hispidis; petioli 2–5 mm. longi, subhispidi, basi stipulis 2 minimis conicis ornat. *Flores* axillares nodis solitarii; pedicelli graciles, circiter 2 cm. longi, basi 1-bracteati; bractea oblanceolato-linearis vel ovato-elliptica, circiter 1.5 cm. longa, breviter petiolulata. *Calycis* segmenta plus minusve 7 mm. longa, basin versus breviter ovata, submembranacea, superne lineari-lanceolata, concava, extra pubescentia, intra basi disco coroniforme minutissime lobato ornata. *Corolla* nigra; tubus breviter et latissime campanulatus, glaber; lobi 7 mm. longi, 3 mm. lati, infra medium constricti, subpanduriformes, elegantissime inflexo-ciliati, supra medium elliptici, subcrassi, dorso concavi, hispiduli, intra nigro-velutini, apice leviter incurvi, pilis paucis longis inflexis induti. *Coronae* exterioris lobi circiter 0.5 mm. longi, bifidi, breviter lanati; coronae interioris lobi lineares incumbenti-conniventes.

NATAL.—Vryheid, among rocks on summit of Lancaster Hill, locally frequent, flower black, Jan., *Galpin*, 10211.

This is yet another new species to the credit of Dr. Ernest Galpin who collected the specimens near Vryheid, Natal, in January, 1930. He recorded the colour of the fresh flowers as black and this is the derivation of the specific epithet. *Brachystelma nigrum* is closely allied to *B. Gerrardi* Harv. (Harv. Thes. Cap. 2: 61, t. 196) and is distinguished from this mainly by the smaller size of the flowers, the shape of the upper portion of the calyx segments and the pubescence of the corolla. The lobes are shortly, although not densely, pubescent on the outer surface and shortly woolly pubescent on the inner surface. The colour of the flower of *B. Gerrardi* is given as "bright metallic green" on the inner face.

An interesting character noted by Bullock when describing *Ceropegia filicalyx* in Hook. Icon. Plant. under t. 3219 (1933), namely "intersepaline glands" has an equivalent structure in both *B. Gerrardi* and *B. nigrum*. These have a minute lobed disc or corona-like structure attached to the base of the calyx round the base of the corolla-tube. Through the courtesy of the Mycologist in Charge of the Natal Herbarium, Durban, I have examined one calyx of *B. Gerrardi* (Wood, No. 1607) but herbarium material of this species and of *B. nigrum* is insufficient for a comprehensive study of the intercalycine corona-like organ.

A duplicate of Galpin 10211 is in the herbarium of the Royal Botanic Gardens, Kew.

Riocreuxia aberrans *R. A. Dyer*, sp. nov. (Asclepiadeae-Ceropegieae); corollae tubo breviter campanulato valde distincta.

Herba perennis caulibus numerosis. *Caules* erecti vel volubiles circiter 60 cm. alti vel altiores, plus minusve ramosi, pilis uniseriatis induti, internodiis 4-5 cm. longis, nodiis ciliatis. *Folia* patentia, petiolata, reniformi-ovata, circiter 5 cm. longa et lata vel interdum usque 7 cm. longa, basi profunde cordata, apice acuminata, utrinque glabrescentia, margine ciliata; petioli 2-4 cm. longi supra pilosi. *Flores* plures in cymis extra-axillaribus alternantibus, breviter racemosae pedicellis filiformibus. *Calycis* segmenta lineari-lanceolata, glabra, 4 mm. longa. *Corolla* glabra; tubus campanulatus, 5 mm. longus, circiter 6 mm. diametro; lobi lanceolato-lineares, 1.3-1.5 cm. longi, apice coherentes facile liberati. *Corona* exteriora et interiora confluentes; coronae exteriorae lobi brevissimi, bipartiti, coronae interiorae lobi erecti, oblongo-lineares, obtusi vel emarginati, 2 mm. longi, gynostegium multo superanti.

TRANSVAAL.—Ermelo distr.: On farm "The Gem," Dec., *Walker in Nat. Herb.*, 14397 (type). Belfast distr.: Dullstroom, on farm "Paardeplaats," 7,000 ft., local on low, dry ridge of barren white quartzite, bush 2 ft. high, Jan., *Galpin*, 13302 (fruit).

Although the specimen *Galpin*, 13302 is in fruit and has no flowers, it resembles the type so closely in vegetative characters, that I have little doubt that it is the same species. The type material was collected in flower in December and the fruiting specimen in January, which is consistent with seasonal development. Further the leaves of the fruiting specimen are coarser and slightly larger, up to 7 cm. long and broad, the maximum figure given in the above description. The follicles of the Galpin specimen are up to 10 cm. long and are slightly constricted at intervals of 6-7 mm.

Riocreuxia aberrans differs markedly from all others in the genus (hence the name) by the short campanulate tube, whereas the usual form is cylindric. At first sight there appears to be only one corona, owing to the very small bilobed outer corona lobes fusing at the base with the inner ones, the lobes of the outer ones having the appearance of basal expansions of the inner ones.

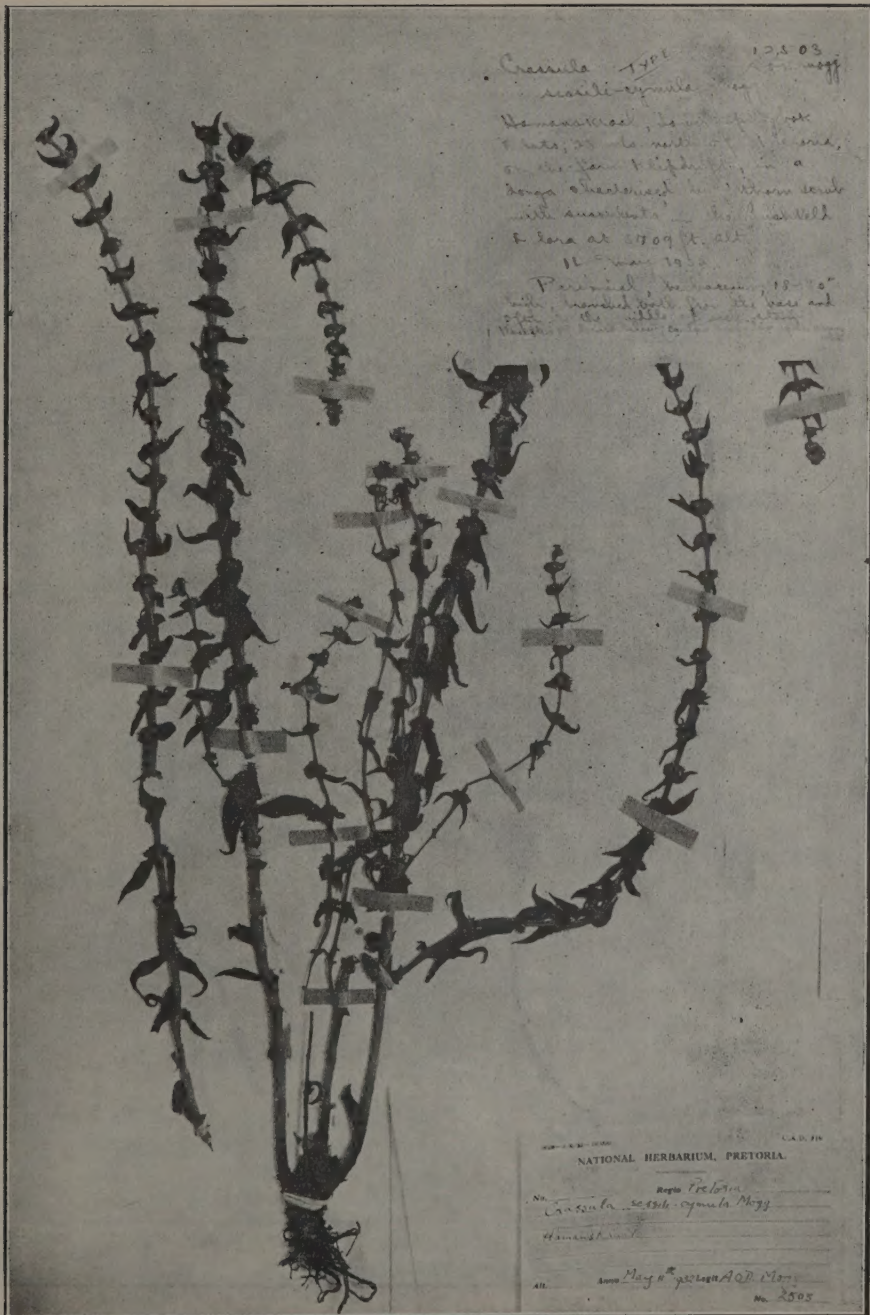
Another question which requires further investigation is whether the corolla lobes remain attached at the tips when the flowers open normally. Most of the open flowers on the type have the corolla lobes free, but this may have been caused during the preparation of the specimen. If, on the other hand, it is the normal habit of the species, it constitutes a second important difference in this species from the generic characters of *Riocreuxia*, the other being the comparatively short campanulate tube. Together, these differences would be sufficient reason for placing it in a separate genus.

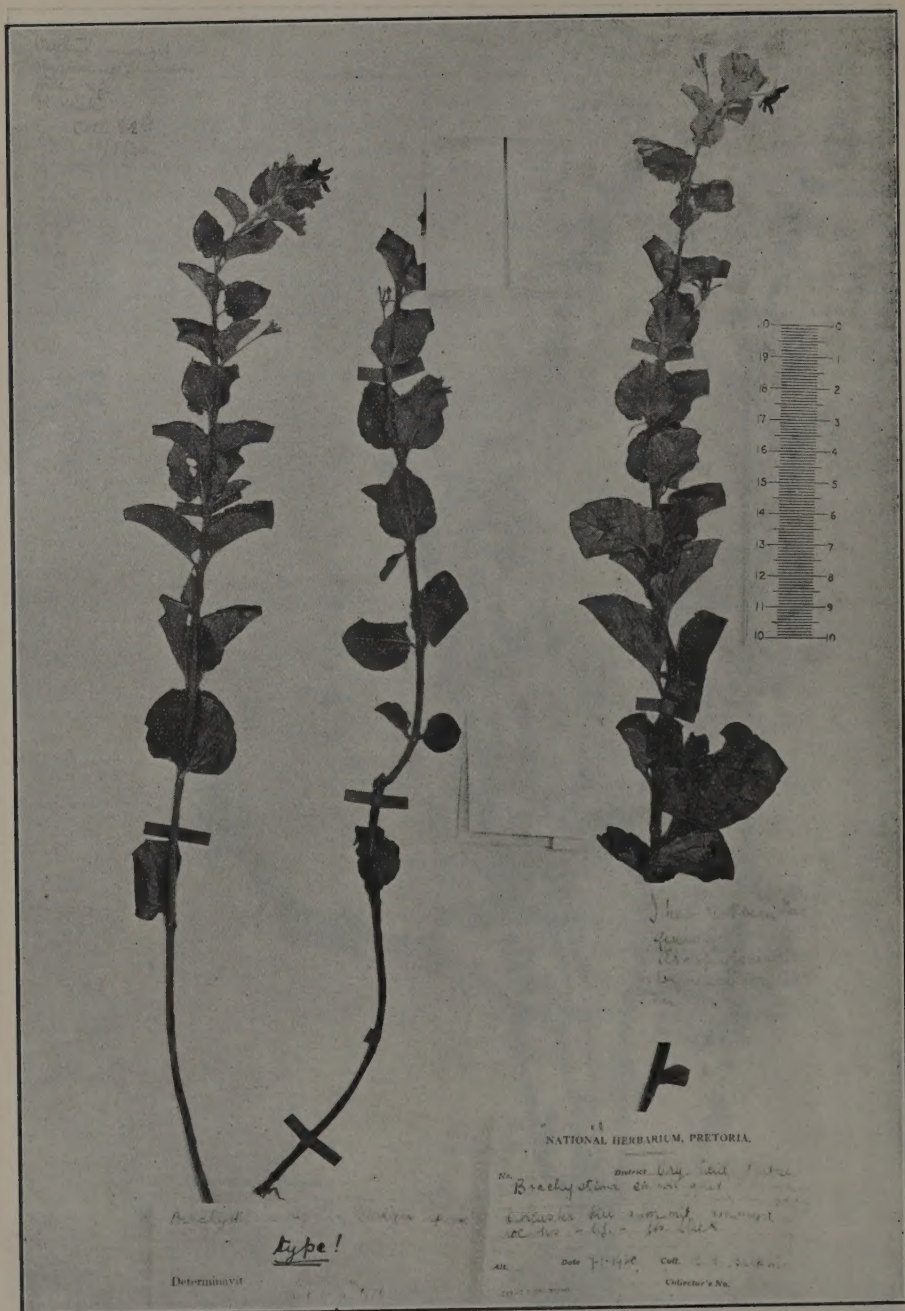
Leucadendron elimense Phillips (Proteaceae-Proteae); affinis *L. concolori*; sed foliis glabris differt.

Suffrutex; ramuli dense pubescentes. *Folia* 2.5–3 cm. longa, 0.8–1.1 cm. lata, lanceolata, apice obtusa, glabra. *Inflorescentia* ♂ 2.7 cm. lata. *Receptaculum* 2 cm. longum, 5 mm. latum, oblongum. *Bracteae* 1 cm. longae, 1 mm. latae, lineares, apice subacutae, carinatae, supra pubescentes. *Perianthii tubus* 1.1 cm. longus, cylindricus, glaber; segmenta 2 mm. longa, linearia, sparsim pilosa; lobi 4 mm. longi, lineares, apice obtusi, glabri. *Antherae* 3.5 mm. longae, lineares. *Stylus* 1.7 cm. longus. *Inflorescentia* ♀ 2 cm. lata, subglobosa. *Receptaculum* 1.3 cm. longum, 5 mm. latum, oblongum. *Bracteae* 8 mm. longae, 4.5 mm. latae, apice plus minusve obtusae, infra pilosae. *Perianthii tubus* 8 mm. longus, planus, pilosus; segmenta 2 mm. longa, linearia; lobi 1.5 mm. longi, oblongi, apice obtusi. *Ovarium* 1.5 mm. longum, ellipticum, pilosum; stylus 1.5 cm. longus, glaber; stigma paullo expansum, semi-obliquum.

CAPE PROVINCE.—Caledon distr.: Koegelberg, alt. 3,500 ft., *Stokoe in National Herbarium*, 21906.

The species resembles *L. concolor* R. Br. but the leaves are not densely villous along the margins. The female heads are surrounded by ovate ciliate glabrous bracts, and both the male and female heads are surrounded by leaves, similar to the stem leaves, but larger and yellow and with red tips, longer than the heads.

*Crassula sessilicymula* Mogg

*Brachystelma nigrum* R. A. Dyer

*Riocreuzia aberrans* R. A. Dyer

